CONCRETE CONSTRUCTION P O BOX 444 ELMHURST ILLINOIS TERRACE 4 5110

APRIL 1961

editor and publisher
WILLIAM M. AVERY

co-publisher
JOHN M. ENGLE

assistant editor
CLARISSA B. McKNIGHT

contributing editor
RALPH IRONMAN

editorial assistant
M. E. CULLEN

production manager
DOROTHY LUXFORD

distribution manager
DOROTHY MOUCKA

ADVERTISING OFFICES

home office
P. O. Box 444—Elmhurst, Ill.
TErrace 4-5110

east coast
WALTER J. MASTERSON JR.
P. O. Box 206—Essex, Conn.
South 7-1838

Published monthly and copyrighted © 1961 by Concrete Construction Publications, Inc. Accepted as controlled circulation publication at Chicago, Illinois. Individual subscriptions at the rate of $10.00 per year, $19.00 for 2 years (U.S.A.); $20.00 per year (Foreign). Single copies $1.00. Bound volumes of previous year's issues, when available, at $10.00 (U.S.A.), $15.00 (foreign). Subscription and bound volume orders must be accompanied by check or money order.

COMING NEXT MONTH

Since European designers and builders are, generally speaking, far more dependent on concrete than their American counterparts, there is often in evidence a correspondingly greater willingness to experiment with new concepts and uses. Next month, Concrete Construction will focus attention on some interesting recent developments in four European countries —Holland, Italy, England, and Norway.

FROM HOLLAND: Site Precasting. A Dutch contractor achieves the economy of precasting and the flexibility of cast-in-place construction by setting up a casting yard on each project site.

FROM ITALY: Deep Excavation Work Without Sheet Piling. How an Italian firm has used concrete and bentonite prior to main excavation to eliminate sheet piling in the construction of underpass retaining walls.

FROM ENGLAND: Polystyrene Form Linings. An account of a British project in which polystyrene-lined forms were used to produce blemish-free support columns for a highway overpass.

FROM NORWAY: Exposed Aggregate Concrete Murals By Sandblasting. A combination of injection grouting and sandblasting by an artist opens up new vistas for the wide use of exposed aggregate concrete as a decorative medium for both interior and exterior surfaces.

Over 36,000 copies mailed. Edited for all who are concerned with quality, job placed concrete (including prestress, tilt-up, lift slab, and thin-shell)—its specification, production, handling, forming, reinforcing, placing, finishing and curing: *Concrete Contractors, General Contractors, Engineers, Architects, Industrial Construction and Maintenance Men, Highway Engineers, Ready-Mix and Prestressed Concrete Producers.*

About our page numbers: The pages of Concrete Construction Magazine are numbered consecutively from January through December each year as a means of facilitating the use of bound volumes for reference purposes.

CONCRETE SURFACE DEFECTS

There are many causes for concrete surface defects. Some of the major defects, their causes and the construction techniques which should be used to prevent them are described as follows:

scaling

Scaling is when the surface of a hardened concrete slab breaks away from the slab to a depth of about 1/16 to 3/16 in. This usually occurs at an early age of the slab.

CAUSES	PREVENTIVE MEASURES
1 Early cycles of freezing and thawing of the surface of newly placed concrete.	**1** The temperature of freshly placed concrete should be maintained above 50 deg. F. for at least 5 days when using normal portland cement and above 50 deg. F. for at least 3 days when using high-early-strength portland cement.
2 Cycles of freezing and thawing when non-air-entrained concrete was used.	**2** Use air-entrained concrete.
3 Applications of deicing salts when non-air-entrained concrete was used.	**3** Use air-entrained concrete.
4 Faulty workmanship. Any one of the finishing operations – screeding, darbying, floating or troweling–performed while free water or bled water is on the surface, will cause scaling. Mixing this excess water into the top of the slab will cause a segregation of the surface fines (sand and cement) and cause scaling. It will also cause a thin layer of neat cement, clay and silt to be brought to the surface. Just under this layer will be another layer of nearly clean washed sand which is not bonded to the concrete under it.	**4** No finishing operation should ever be performed while free water is present. Water should be allowed to evaporate from the surface, or be forced to evaporate by fans or blower-type heaters, or it should be removed by dragging a rubber garden hose over the surface.

This article is an authorized reprint from the *Cement Mason's Manual*, a new publication of the Portland Cement Association.

crazing

Crazing is the occurrence of numerous fine hair cracks in the surface of a newly hardened slab due to surface shrinkage. These cracks form an overall pattern similar to a crushed eggshell.

CAUSES	PREVENTIVE MEASURES
1 Rapid surface drying usually caused by either high air temperatures, hot sun or drying winds, or a combination of any of these.	**1** Apply fog spray or cover with burlap or canvas immediately after screeding and darbying. Keep surface covered with burlap or canvas kept continuously damp until ready for floating and troweling. Moist cure as soon as possible without marring the surface. For high temperatures or hot sun, some form of curing with water should be used since it will maintain or lower the concrete surface temperatures.
2 Premature floating and troweling. Floating and troweling when there is an excess amount of moisture at the surface or while concrete is still too plastic. Premature floating and troweling brings an excess amount of fines and moisture to the surface. A rapid loss of this moisture will cause shrinkage at the surface, which may result in crazing.	**2** Do not start floating and troweling until excess moisture has evaporated from the surface, and the concrete has started its initial set. To avoid excess moisture, reduce the slump and use air-entrained concrete.
3 Overuse of the jitterbug, vibrating screed, darby or bull float may contribute by working an excess of mortar to the surface.	**3** Use these tools sparingly. Because the excess mortar at the surface tends to cause additional surface shrinkage, delayed floating and troweling operations are required for proper compaction.

dusting

The appearance of a powdery material at the surface of a newly hardened concrete slab is called dusting.

CAUSES	PREVENTIVE MEASURES
1 An excess of clay or silt in the concrete. These harmful fines mix with the sand and cement at the surface and result in dusting.	**1** Use clean and well-graded coarse and fine aggregate.
2 Premature floating and troweling. Premature floating, in particular, mixes excess surface water with the surface fines, thereby weakening the strength of the cement paste.	**2** Delay floating and troweling until all free water or excess moisture have disappeared and concrete has started its initial set.
3 Carbon dioxide from open salamanders or gasoline engines, power buggies or mixer engines. When this gas comes into contact with the surface of plastic concrete, a reaction takes place which impairs proper hydration.	**3** Vent salamander fumes to the outside. Provide sufficient ventilation.
4 Condensation on the surface before floating and troweling operations have been completed. This usually occurs in the spring and fall when materials become cold due to low night temperatures and no provisions have been made for heating the materials. If the temperature of all these materials is approximately 45 deg. F. the concrete will also be approximately 45 deg. F. If this concrete is placed indoors, for example, where it will get no heat from the sun (basement floors and indoor slabs on	**4** If possible, this condition of condensation should be anticipated and the concrete should be heated, or at least hot water should be used for mixing. If this is impossible, use blower-type heaters to lower the humidity directly over the slab and use fans to increase the circulation of air. If heaters and fans are not available, open all windows and doors to increase circulation of air. While condensation is still present, floating and troweling operations should be held to a minimum and the surface

grade), the temperature of the concrete will rise very slowly, and setting is greatly retarded. If air temperature should rise substantially during the day, and the humidity is relatively high, moisture will usually condense on the slab. Floating and troweling of this excess water into the surface causes dusting.

should not be given a second troweling. The use of neat cement as a dry-shake should not be permitted, nor should any mixture of cement and *fine* sand be used as a dry-shake. Since condensation may occur for several hours, and the concrete is beginning to harden, emergency measures must be taken in order to finish the slab. As an emergency a dry mixture of one part of portland cement and one part of well-graded concrete sand should be well mixed and evenly and lightly distributed over the surface. This should be *immediately* floated thoroughly into the surface and followed *at once* by troweling. There should be no second troweling, since additional condensation would take place after the first troweling. This problem of condensation is not uncommon, but very few cement masons or superintendents realize when it is happening.

5 Dry heat from winter-protection heaters will lower the relative humidity around the concrete excessively. Concentration of heat on freshly placed concrete will inhibit proper hydration of the cement, resulting in weak concrete and dusting surface.

5 Water jackets should be placed on heaters to increase the relative humidity by evaporation, and any one of the acceptable methods of moist curing should be employed. Location of heaters should be changed periodically so that no area will be subjected to an extreme or harmful amount of heat.

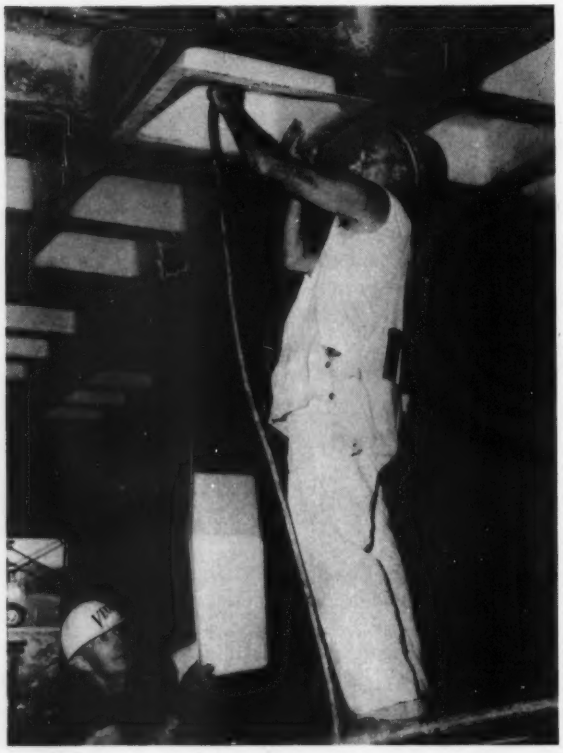
6 No curing or inadequate curing.

6 Proper curing for the specified length of time is essential. Concrete which is not cured will often be weak and the surface easily worn by foot traffic.

Molded Fiber Glass Forming Pans

No special crews are needed to set molded fiber glass forming pans. A single broad-headed nail at each corner is all that is needed to hold them in position. Because they are true to size there is no problem of alignment.

The specially-engineered surface of the pans makes stripping quick and easy. Two 60- by 130-foot floors were completely stripped in a day by a crew of twelve. Only a negligible amount of flash remains after stripping.



NEWLY-ENGINEERED molded fiber glass concrete forming pans are credited with a 15 percent saving in initial cost and with cutting total stripping time to 5 seconds a square foot on a 5-building residence hall project at Pennsylvania State University. The 19- by 19- by 8-inch void pans, which weigh but 6¾ pounds are being used a total of 42,000 times to form the floors and waffle-like ceilings.

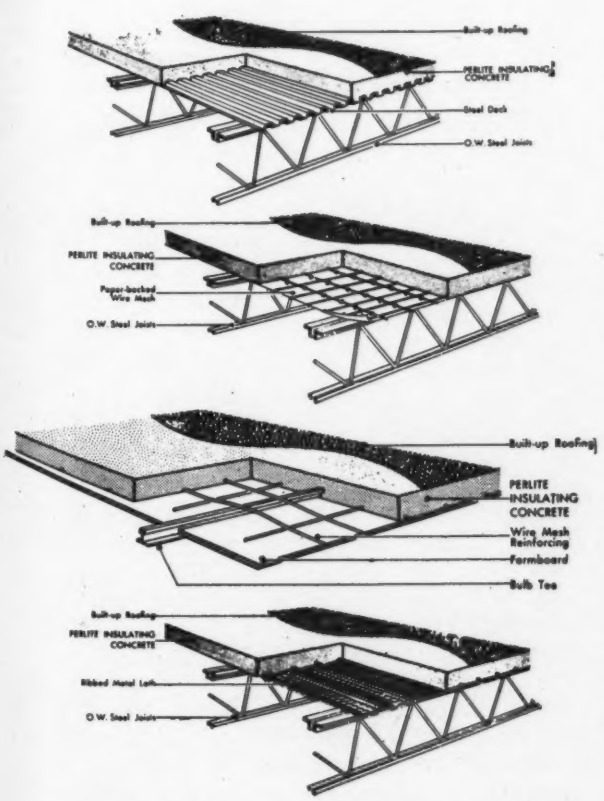
The architects, *Harbeson, Hough, Livingston and Larson,* and the structural engineers, *Sauter & Castor and A. W. Lookup Company,* all of Philadelphia, have taken advantage of both the economy and the design possibilities of grid slab construction. Using forming pans, with steel reinforcing rods, electrical conduits and other fixtures run between and over the pans, the floor slab and the waffle-like ceiling below are formed at one pour.

When the concrete is cured — a 5-day period on this project — the scaffolding, supports for the pans and the forming pans themselves are removed from below, exposing a ceiling finished except for painting. The waffle pattern of exposed reinforced concrete ribs created by the pans gives a feeling of openness and space that makes practicable the 7-foot 4-inch ceiling that features most floors of this 5-building project. Other plus factors cited for the pans are light weight; good dimensional stability; non-warping, non-denting, non-rusting surface; and smooth, long-wearing finish with superior wetting and easy release characteristics.

Important savings in time and labor required to handle, erect and strip the formwork for the floors on the Penn State job are attributed to use of the pans. Cost is running under 6 cents a square foot for setting, stripping, cleaning where necessary, and moving the pans to the next floor; and an estimated 19 cents a square foot for all the rest of the form costs including the setting, removing and transfer to the next floor of the bucks, supporting lumber and plywood pan-support floor. Only 4 to 5 hours' time is required to completely strip a 60- by 130-foot floor of scaffolds, supporting timbers, plywood floors and pans, and to move them all to the next floor ready for placement; the same crew of 12 men has stripped two such floors in a single day. This work is done by the regular carpenters and laborers on the project. *Virginia Engineering Company* of Newport News, Virginia is the prime contractor for the project. END

PERLITE roof deck & insulating concrete

PERLITE was formed millions of years ago when the Rocky Mountains erupted from the Great Western Plains. As volcanoes spewed molten lava over the countryside, the lava cooled to form deposits of glass-like minerals such as obsidian, pitchstone and pumice. One type of lava was named perlite by geologists because under a microscope it looked like tiny clusters of pearls. It was discovered that if heat, such as the flame of a blowtorch, is applied to crude perlite particles, the particles "pop" or expand—just like popcorn. It is this ability to pop that distinguishes perlite from all other volcanic rocks.



These drawings show some of the light structural materials commonly used to support perlite insulating concrete. Of course, if the roof deck is cast of structural concrete, the perlite concrete is placed directly over the structural concrete.

When popped, the crude rock expands to about ten times its original volume. The density of the expanded material is thus about one-tenth that of the crude perlite. Expanded perlite weighs only 7½ to 10 pounds per cubic foot—approximately one-twelfth as much as sand. During the popping process, the color of perlite also changes from gray or black to almost pure white.

Under a microscope, it can be seen that expanded perlite particles are composed of many tiny glass-sealed dead air cells. These cells account for the excellent insulating value of expanded perlite which has a thermal conductivity or "k" factor of .34 when graded for use as a concrete aggregate.

Crude perlite is mined in seven Western States: Arizona, California, Colorado, Idaho, Nevada, New Mexico, and Utah. The crude perlite is mined by open pit methods and then crushed to sand-size particles before shipment to expanding plants in 32 states.

Specially designed furnaces are used for expanding the crude perlite at temperatures ranging between 1500 and 2000 degrees F. From the furnace the expanded perlite goes through a cyclone separating system that removes extremely fine particles not suitable for use as concrete or plaster aggregates. The expanded perlite is then packaged in strong paper bags which hold 3 or 4 cubic feet of aggregate. A 4-cubic-foot bag of the material weighs only about 32 pounds. By comparison, the same volume of sand would weigh nearly 400 pounds. Perlite aggregate for use in insulating concrete is produced to conform to ASTM Specification C-332.

The qualities of lightweight, fire safety and insulation which have made perlite the leading plaster aggregate also make it ideally suited for use as an aggregate in insulating concrete for roof decks and other types of construction requiring these properties. Over ten years of research and practical field experience with perlite concrete have laid a firm base for its acceptance by architects, building officials, contractors, engineers, and other building

TABLE 1: Typical Mix Designs and Physical Properties of Perlite Insulating Concrete

†Dry Concrete Properties										Mix Proportion by Volume				Field Tests
mix ratio	* oven dry density (lb. per cu. ft.)	* compressive strength (psi at 28 days)	** thermal conductivity "k"	* coefficient of thermal expansion (per unit per °F)	* tensile strength (psi at 28 days)	* bond strength to steel (psi at 28 days)	* modulus of elasticity in compression (psi at 28 days)	* indentation strength 1" disc[1] (psi)	* indentation strength ½" ball[2] (lb)	cement (sacks)	Perlite (cu. ft.)	water (gal. per sack cement)	air entraining agent *** (pints)	*†wet density as poured (lb. per cu. ft.)
1:4	36	440	0.77	0.0000061	75	83	248,000	485	210	1	4	9	1	50½
1:5	30½	270	0.64	0.0000055	50	53	158,000	335	130	1	5	11	1¼	45½
1:6	27	180	0.58	0.0000048	40	23	120,000	260	105	1	6	12	1½	40½
1:7	††24	130	0.54	0.0000045	30	—	94,000	220	85	1	7	14	1¾	38
1:8	22	95	0.51	0.0000043	20	—	69,000	185	70	1	8	16	2	36½

*Based on impartial laboratory test data of Robert W. Hunt Co. Engrs. under sponsorship of the Perlite Institute. Average density of the aggregates used was 8.0 lb. per cu. ft. Strength data based on ASTM Type 1 Portland Cement.
**From report dated April 8, 1953, of Armour Research Foundation of Illinois Institute of Technology.
*** Available from Perlite Institute members.
(1)Compression applied as concentrated load until initial failure.
(2)Maximum load required to imbed ball to ½ its diameter.
†Data subject to modification due to variations in mixers and job conditions.
†† All data for this density is interpolated.

TABLE 2

Materials for One Yard†

mix ratio	cement sacks	Perlite cu. ft	water gal	air entraining agent *** pints
1:4	6.75	27	61	6¾
1:5	5.40	27	59½	6¾
1:6	4.50	27	54	6¾
1:7	3.85	27	54	6¾
1:8	3.38	27	54	6¾

NOTE: For explanation of reference marks see notes for Table 1.

TABLE 3

Mix Data for Perlite Concrete Floor Fills

Cement (Sacks)	Perlite (cf)	Heavy Aggregate (cf)	AEA† (oz)	Water U.S. Gal/Sack	Ct. Factor cu. yd.	Density Wet	Density Dry	Compression 28 day, psi
1	3	2*	6	8.5	5.82	82	72	1060
1	3	2**	4	8.5	6.12	66	54	1220

†Available from Perlite Institute, Inc., members. *Sand. **Rotary kiln expanded shale.

professionals.

Perlite insulating concrete consists of a mixture of expanded perlite, Portland cement, water and an air entraining agent. The dry concrete weighs from 20 to 50 pounds per cubic foot, depending on the mix design selected. It is mixed in place, using the same equipment required for handling ordinary concrete, including transit-mix trucks.

The most common use of perlite insulating concrete is in roof deck construction, since it offers excellent insulation plus great strength, rigidity and fire safety. In addition, perlite concrete is adaptable to most design requirements since it can be placed monolithically on flat, uneven, curved or sloping surfaces.

The 1:6 mix is most commonly used for roof decks since it offers an ideal balance of low dead weight, adequate compressive and indentation strength and good insulating value. A 1:4 mix is used when greater strengths are required and the 1:8 mix for its greater insulating properties. Table 1 shows the physical properties for the various mix designs.

For insulating roof decks cast of structural concrete, the perlite concrete is placed directly over the structural concrete. No priming, waterproofing or special preparation of the deck is required for most installations.

For maximum economy, the structural deck and insulation can be combined in one lightweight slab of perlite concrete. Builders can choose from many light structural forms to support the insulating concrete, such as paper-backed wire mesh, high ribbed metal lath, formboards supported by bulb tees, or one of several types of light gauge metal decks. No other insulation is needed over the perlite insulating concrete slab.

Once placed, the concrete is simply leveled by screeding. No steel troweling is required, and the textured surface left by the screed is ideal for the application of built-up roofing. The insulating slab is monolithic, hard, firm and durable. Low in first cost, it practically eliminates future maintenance costs.

Perlite concrete is also being used as a floor fill in multiple story buildings, in insulating concrete blocks and tilt-up panels, and as exterior insulating walls sprayed on the back of metal panel facings. It can also be used as non-load bearing fill in bridges, tunnels, and other types of construction.

Some of the specific advantages of perlite insulating concrete responsible for its continued acceptance in the construction field are the following:

INSULATION is probably of first importance. With the rapid growth of air conditioning, roof insulation is now becoming a "must" in nearly every section of the country, from the hot South to the cold North. Loose perlite, because of its sealed

dead air cells, is one of the best heat insulators known. When it is mixed with Portland cement, its insulating value decreases somewhat, since the cement acts as a conductor. As more and more cement is added, the strength of the concrete increases while the insulating value decreases. Thus, by specifying the proportions of perlite and cement which are to be mixed, the architect can strike a desirable balance between the strength and insulating value of the concrete. A mix of one cubic foot of cement to six cubic feet of perlite aggregate provides both excellent strength and insulation value. Perlite insulating concrete mixed in these proportions has an insulating value ("k" factor) of 0.58 BTU per hour per square foot per degree F. per inch—20 times better than ordinary concrete. As a general rule of thumb, it may be figured that a 2-inch thickness of perlite insulating concrete provides insulation equivalent to 1 inch of fiberboard insulating materials.

STRENGTH AND RIGIDITY of the roof deck are greatly increased. Where metal lath, paper backed wire mesh, or bulb tees and formboards are used, the perlite concrete combines the functions of roof deck slab and insulation. No additional insulating materials are needed. Over light gauge metal decks, the perlite concrete provides insulation, a level roofing surface, and adds tremendously to the rigidity of the system.

FIRE SAFETY of perlite concrete is unsurpassed by most roof insulating materials of equivalent thickness. Perlite concrete is, of course, incombustible. When used as insulation over a corrugated steel deck, perlite concrete gives the system more than a 1-hour fire rating, even when the underside of the steel deck is left bare and unprotected by a ceiling or any supplementary fireproofing. When additional fire protection is necessary, the metal deck and supporting beams or joists are protected by a perlite-gypsum plaster ceiling which will produce up to four hour fire ratings.

While perlite concrete cannot burn, it is equally important to note that no combustible materials are needed to hold it in place in the roof deck system. The concrete bonds directly to metal, structural concrete, formboards or other roof decking materials. In case of fire, no combustibles are under the insulation. In fact, the insulating concrete serves as a continuous shield to bar flames from interior fires from reaching roofing felts and tars. And since the perlite concrete is monolithically placed, cracks through which fire might penetrate are practically eliminated. The possibility of pitch or tar dripping through cracks is also minimized.

PERMANENCE of perlite insulating concrete is another important factor. Perlite concrete is not subject to rot, mildew or damage by water. Its strength increases with age. Once the concrete is set, water can't hurt it structurally. All of these factors are of long term concern to the architect, the owner and the contractor.

Perlite insulating concrete may be mixed in either a paddle type or drum type concrete mixer. In either case, the recommended procedure is as follows: First, add to the mixer all the required amount of water as specified, or predetermined for the batch. Add the specified amount of air entraining solution and cement and mix until a slurry is formed. Second, add the specified amount of perlite concrete aggregate to the slurry and mix until plastic or workable.

The mixing time will be governed by the type of equipment used and can be determined by checking the wet density of the perlite concrete at intervals until the specified wet density is reached.

When transit mixing perlite concrete, the drum can be charged with water, air entraining agent and cement at the batching plant, and the perlite aggregate can be added at the job site, mixing at high speed until the desired density and consistency is reached. If the perlite aggregate is added at the batching plant and the drum is rotated during transit, it should be at slow speed for no longer than five minutes. Upon arriving at the job site, mix at top speed for at least five and not more than ten minutes.

Under normal conditions, perlite insulating concrete has an adequate mixing water content so as to have sufficient water for proper curing of the concrete without any additional sprinkling, etc. The built-up roofing may be applied as soon as the perlite concrete is capable of carrying construction traffic and is dry enough to develop adhesion with the hot asphalt or pitch.

Due to the great surface area of expanded perlite particles, perlite concrete does require more mixing water than heavy dense aggregates used for structural concretes. However, because of the closed cellular nature of perlite particles, mixing water is readily released for rapid drying after the concrete is placed. Thus, because of its moderate water requirements, perlite concrete develops greater strength, has less shrinkage, and drys out faster than concrete made with comparable aggregates in the same weight class.

Table 2 lists water requirements and quantities of other materials required per cubic yard. This data is considered accurate but may require slight modification due to variations in mixers and job conditions.

For greater strength and correspondingly greater density, blends of perlite and sand or perlite and medium weight aggregates may be used. (See Table 3 for typical mix data on these combinations.) However, due to the varying characteristics of naturally occurring aggregates in different sections of the country, the local perlite aggregate manufacturer should be consulted before specifying blends of perlite and other aggregates. END

latex modified concrete

for resurfacing

DURING THE PAST DECADE the advent of new bonding materials has provided a means of successful concrete patching and repair along with a reduction in cost and time factors. Among these new materials are epoxy resins which, in combination with sand, form an unusually tough adhesive layer that tenaciously bonds old to old and new to old concrete. More recently developed are synthetic latex modifiers. These materials, added to ordinary mortar, provide equally great adhesive properties, along with good resilience, elasticity and durability.

Of particular importance in concrete repair work, latex modified mixes have also proved valuable for ceramic tile grout and bedding, coating for industrial insulation, brick and concrete block mortars, and dust proofing concrete floors. Latex has also been used to produce a stucco that is stronger and more durable than ordinary stucco, and which gives a better over-all bond to the substrate as well as tight and sound coverage of metal corner strips.

Synthetic latexes are polymer (plastic) particles dispersed in water. One type available is a styrene-butadiene copolymer dispersed in water containing 48 percent solids, weighing 8.4 pounds per gallon, with a pH of 10.5. Another more recently developed has about 51 percent solids, weighs 10.4 pounds per gallon, with a pH of 2.0.

For some time synthetic latexes have been used in paints, for textile and paper coatings, and as binders for textile and fabric printing pastes. As a concrete additive, the white, milky fluid combines with the customary sand-cement-water mix to produce a mortar that cures with high compressive and tensile strength, great flexibility, strong resistance to alkalis and dilute acids, low water absorption qualities and good freeze-thaw stability. What is more, latex modifiers are low in cost.

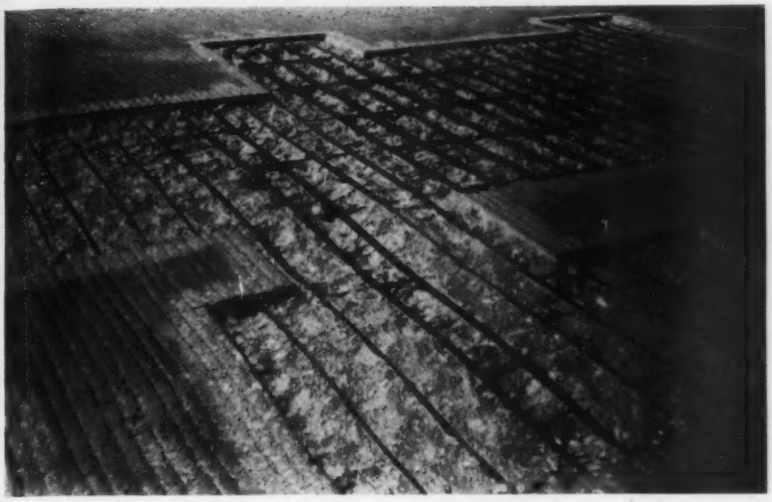
Experimental mixes containing varying amounts of latex modifier have yielded, depending on the cement-sand-water ratios, compressive strengths of up to 7,000 psi, shear bond and tensile strengths of up to 1,000 psi, and flexibility of better than 2,000 psi.

Latex modified mixes have been used successfully to repair worn, chipped, and badly etched concrete floors. In one experiment, after the old concrete was chipped and cleaned down to a solid base, latex modified mortar was placed, screeded, and finished with steel trowels. Within two days, regular traffic was resumed on the floor and the topping remained in good conditions during several years of continuous use.

In another instance, a latex mix was placed over a wood sub-floor after removal of the damaged maple top flooring. The sub-flooring had shrunk and pulled apart to a point where light was admitted between the boards. After an initial coating of 50/50 latex/water had become tacky, the modified mix was placed and screeded level with the surrounding floor. Finally, the job was steel troweled, and the result was a new surface with good bond and durability and a resiliency comparable to that of the original wood flooring.

The bonding qualities of latex modified mortar have made possible the raising of a floor level by ¾ inch to accommodate a carpet, and such mortar has been used successfully as underlayment for regular floor tile. Surfaces of latex concrete laid in dairy barns and creameries have successfully resisted wear and acids that cause spalling and other failure.

Numerous experiments have indicated the value of latex modified mixes in exterior applications. One extensive test involving highway repair was carried out on a three-span bascule bridge over the Cheboygan River on U. S. 23 at Cheboygan, Michigan. This 40-foot-wide bridge has 58 feet of



LEFT: This bridge deck area is prepared for latex mortar surfacing. The routed out areas had cracked and chipped because of vibration of the reinforcing rods which were too close to the surface.

BELOW: Workability of latex modified portland cement compositions permits screeding or striking-off by conventional manual means or by power equipment.

concrete roadway at each end of a 38-foot open steel grid. Built in 1940, the roadway had by 1957 become badly scaled from weathering and deicing salts, and highly polished by traffic.

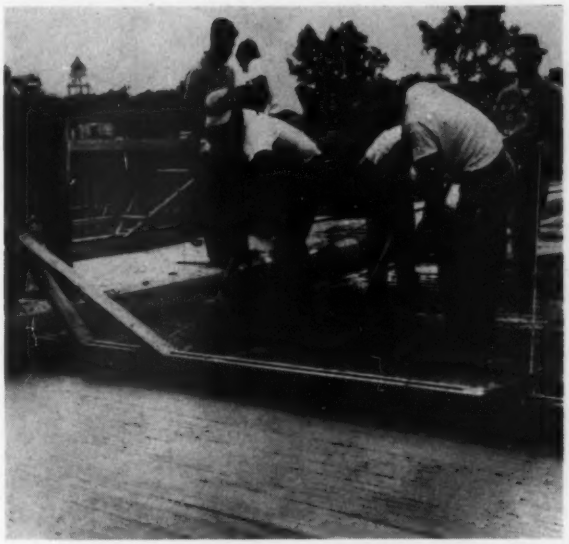
Unsound and scaled surfaces on the Cheboygan bridge were removed to allow for the placement of a minimum thickness of ½ inch latex modified mortar. To maintain the proper depth of patch and crown of the deck surface during screeding and finishing operations, narrow steel strike off bars were greased and set with anchor bolts along the edge of each lane. After the mortar had cured, these bars were removed.

To test various ways of preparing the cleaned deck surface to receive the concrete, four methods of preparation were used. In one place, the surface was thoroughly wet with water. Another area was left dry and untreated. On a third portion, a bond coat of straight latex emulsion was brushed into the surface and dried until tacky. Finally, a slurry of latex and cement at 1 : 1 was broomed into one portion of the deck.

A total of six loads of transit mixed latex mortar containing sand and cement at a ratio of 3 : 1 and latex solids of 20 percent based on cement weight was applied to the bridge. After screeding and troweling, the repaired surfaces were covered with wet burlap for 24 hours. Then they were air cured for 6 days, after which the bridge was reopened to traffic.

Tests indicated that the newly placed latex modified concrete attained an average compressive strength after 28 days of 2,522 psi and an average flexural strength of 917 psi. At 90 days, the average compressive strength was 3,092 psi and the average flexural strength 728 psi.

After one winter of use, it was found that nearly all concrete laid over a wet substrate remained intact. But in the areas prepared by the other three methods, there were varying degrees of



The thin resurfacing allowed by use of latex modified cement compositions are further enhanced by the ability to feather-edge trowel them without loss of bond.

Pictured below, are wood screed bars positioned along a badly spalled sidewalk in preparation for resurfacing with latex modified mortar. Rough brooming provided a non-skid surface for the hill slope. The resurfaced walk, shown to the right, is in excellent condition after 4 years of wear.

The upper of the photos below shows a concrete floor that has been patched with unmodified concrete and with asphaltic materials without success. The damaged area was chipped out to solid concrete and the base was vacuumed. The lower picture shows the placing of latex modified concrete on the base and screeding with a 2 by 4. The new surface was rough-finished with a steel trowel. A year later, in spite of industrial traffic, the resurfaced areas remain intact.

failure. The dry and untreated area had 80 percent failure; that with a latex bond coat about 50 percent; and that covered with latex-cement slurry, 100 percent. These areas were cleaned again and new latex-cement mortar applied, this time over the deck washed and soaked with water.

Among the variations tried was the addition of about 5 percent diethylene glycol to increase the finishing time and reduce the tendency of the latex mortar to skin over and produce shrinkage cracks. The glycol reduced this tendency, but did not eliminate it.

After two winters of use, the following conclusions were reached:

1. There was no bond failure where the substrate had been thoroughly soaked with water.
2. Great fluidity is possible with fairly low water/cement ratios.
3. Latex mortar is highly susceptible to skinning over and shrinkage crack formation if not immediately covered with wet burlap after the final finishing. The addition of diethylene glycol curbs but does not eliminate this tendency.

Experience has indicated the need to adopt certain procedures with latex modified concrete that vary somewhat from methods followed with conventional mixes. Generally the procedures for mixing and applying latex concrete are the same for interior and exterior areas, although there are some slight differences.

surface preparation

In both interior and exterior application, all loose, scaled, broken and dirty concrete must be removed. Scarifying machines may be used to prepare broad areas. A good procedure is to scrub the surface thoroughly with a detergent and wash

it down several times; the surface may also be brushed or blown clean with air. Concrete should be removed from the perimeter of the area to be resurfaced to maintain the minimum thickness of ½ inch and to avoid feather edging. Deep cracks should be routed to a minimum depth of 2 inches or to sound concrete, and exposed metal rods and joints sandblasted clean.

When working on roadways or bridges, longitudinal strike off metal screeds should be secured every 3 feet on each side of the area. These bars should be grounded to sound concrete by counter sunk bolts.

A day before resurfacing begins, the area should be thoroughly soaked with water. If rapid evaporation is likely, the area should be covered with damp burlap until application commences. An alternate method, used only in resurfacing wood floors, is to coat the old base with a 50/50 mixture of latex-water. This mixture should become tacky, but not dry.

mixing

Latex loses its stability with air entrainment; hence, no air entraining admixture is used in the mortar. In fact, it is a good idea to add an antifoamer to the latex before placing it in the mixer.

The latex is poured into the mixer and sand and cement are added, along with diethylene glycol. The amount of water in the mix depends on the moisture content of the sand. There should, of course, be sufficient water for workable mortar consistency.

Two to 4 minutes is the recommended mixing time, but to avoid air entrapment it must not exceed 5 minutes. The load should be dumped immediately upon completion of the mixing, due to the brief working life of latex modified mortar. If circumstances prevent immediate discharging, the mixer should be shut off.

placement and finishing

The area should be kept damp ahead of the placing of the resurfacing material. Best results are obtained by thoroughly brushing a portion of the mortar into the substrate and then completing the pour to bring the concrete up to the desired finishing level. The use of two screeds helps to avoid surface skinning and results in a smoother job. The first screed makes a rough strike off and the second gives the final surface for troweling. The initial strike off bar should be screeded over the mortar with a sawing motion, the second with a rapid see-saw motion.

Because of wet drag, latex mixes are often more difficult to trowel than conventional mixes. They also set more rapidly and form a surface skin that will tear if worked too hard. To facilitate troweling, the area can be rewet with 50/50 latex-water. Little pressure is needed for the efficient troweling of latex modified mortar. To improve slip and avoid wet tear, the forward edge of the trowel should be kept as close to the surface of the wet mix as possible without touching it. Since latex mixes set rapidly, it is essential that troweling, like screeding, proceed without delay.

Interior applications of latex mixes reach maximum properties by air curing at normal temperatures. Consequently, freshly placed concrete may be left uncovered. However, where high temperatures are involved it is desirable to prevent surface dehydration and cracking by covering the area with wet burlap, followed by Sisal-Kraft paper for 24 to 48 hours. Covering is also a good idea when mixes are applied over old wood floors or other substrates that have a high water demand.

After exterior applications are troweled, the area should be cured up to 30 minutes, or until it supports the weight of damp burlap. About an hour later, a second layer of burlap can be applied and kept moist for 48 hours. About 20 minutes after placement the edge of a trowel can be run along the screed bars to release them and thus prevent their permanent bonding to the mortar.

Twenty-four hours following application all construction joints should be covered with an epoxy resin sealer to provide additional protection against water seepage, leeching, and frost damage. Dry sand poured over the sealer while tacky will provide a non-skid surface. Five days after the placement of latex concrete—2 days following the application of the sealer—the surface can be reopened to traffic.

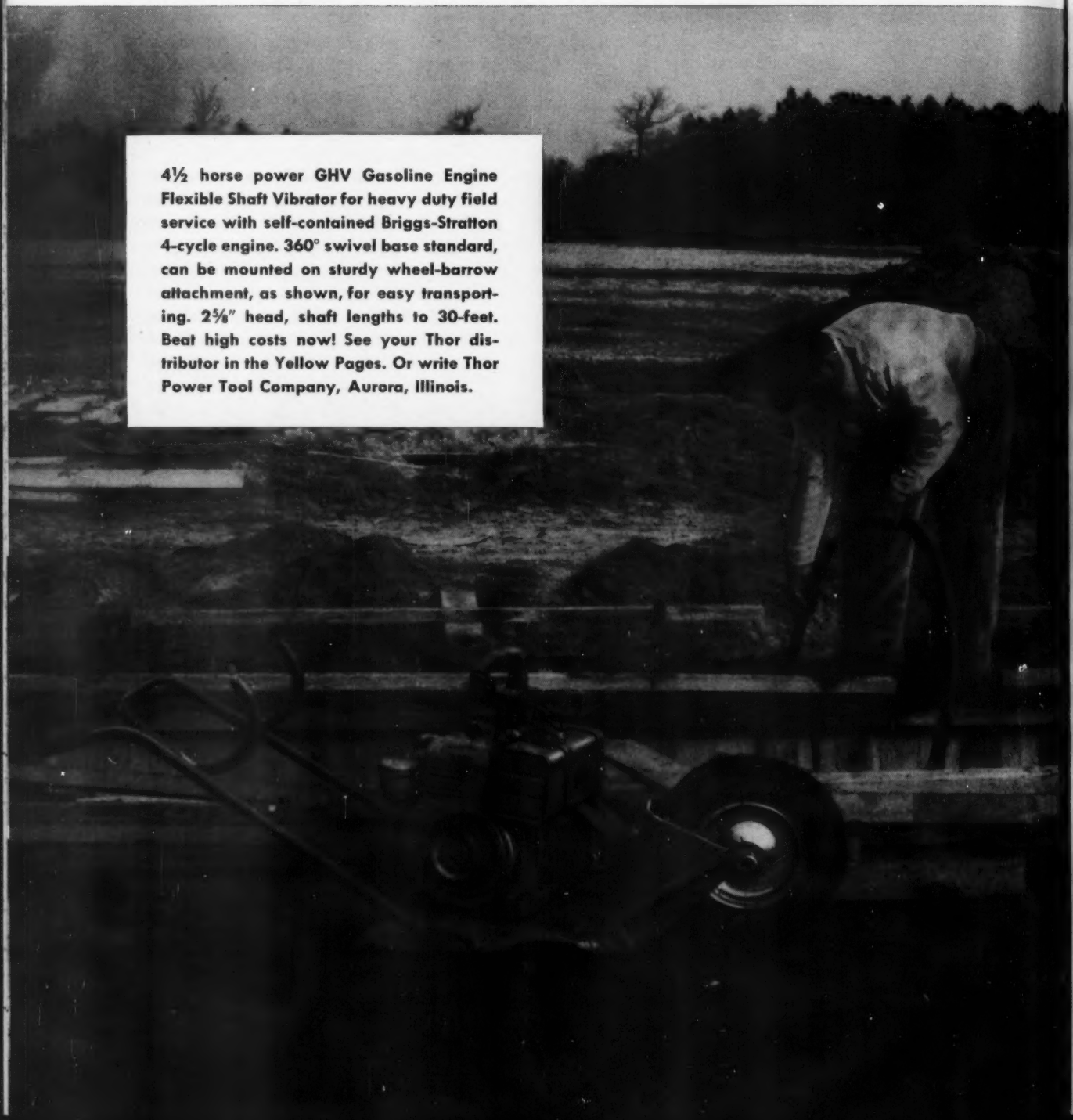
It must be noted that epoxy resins are potentially hazardous. Instructions on their mixing and use should be followed explicitly and they should never be applied without adequate skin and eye protection.

Latex modified mortar turns a green color during the initial cure. This is a temporary condition; the mortar achieves a normal concrete grey after the final cure. The other major differences between latex modified and conventional mortar are: latex mortar has a high slump—up to 8 to 10 inches; it needs no air entrainment; it must be screeded and finished rapidly due to relatively short working life; and, since latex mortar clings tenaciously to mixers and tools, rapid cleanup of equipment is essential.

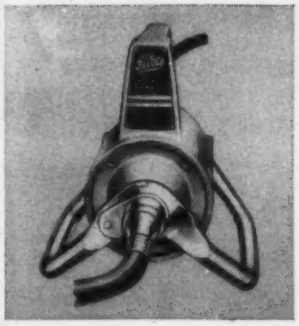
Further experience with latex modified mortars will add to the store of information about them, and possibly alter some of the procedures now recommended. As matters stand, latex modifiers put new muscle and durability into what has long been a standard building and road material. They permit a wide range of applications for tough, long-lasting concrete and, at the same time, can offer architects and contractors additional freedom in design and construction methods. END

Your best bet for better concrete at lower cost

THOR CONCRETE CONSTRUCTION TOOLS



4½ horse power GHV Gasoline Engine Flexible Shaft Vibrator for heavy duty field service with self-contained Briggs-Stratton 4-cycle engine. 360° swivel base standard, can be mounted on sturdy wheel-barrow attachment, as shown, for easy transporting. 2⅝" head, shaft lengths to 30-feet. Beat high costs now! See your Thor distributor in the Yellow Pages. Or write Thor Power Tool Company, Aurora, Illinois.



4 horse power EHV Electric Flexible Shaft Vibrator delivers rugged impact at 10,000 to 12,000 vibrations per minute for heavy duty concrete placing. 2⅝" vibrator head. 5-ft. and 10-ft. shaft lengths, can be connected for efficient use up to 30-feet. Compact, easily carried, or dragged on adjustable runners. Equipment interchangeable with GHV gasoline vibrator.

→ **CV-3 MOTOR-IN-HEAD ELECTRIC VIBRATOR** gives high speed vibration in stiffest mixes. 25% more power for maximum compaction. Motor and vibrating units built snugly into 2⅝" head. Truly a one-man vibrator. 5 operator hose lengths.

↑ **FOR SMALL ACCESS POURS** the durable Thor ELV electric flexible shaft vibrator is Thor's answer. 4 small head sizes (1", 1¼", 1½", 1¾"), 2 shaft lengths with connections for extensions.

↑ **EASY HANDLING** Thor power trowels for work efficiency and operating speed, feature exclusive blade-center suspension. Heavy duty construction. 29" and 39" models.

THOR VIBRATORY FINISHING SCREEDS feature revolutionary "StraPaction," lightweight and low initial cost. Requires no special rails or forms. Models from 4' to 30'. ↓

↑ **PUT POWER WHERE YOU NEED IT, FAST.** Thor gasoline engine generators furnish power for tools, lights, electric vibrators. 1500 watt set shown, also 2500, 3000 watts available.

Thor POWER TOOLS

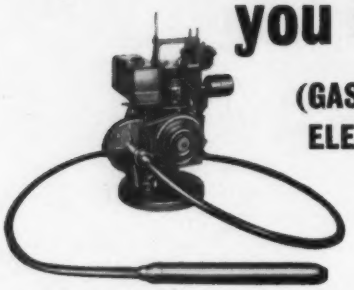
THOR POWER TOOL COMPANY

AURORA, ILLINOIS

ATLANTA • BIRMINGHAM • BOSTON • BUFFALO • CHICAGO
CINCINNATI • CLEVELAND • DENVER • DETROIT • HOUSTON
INDIANAPOLIS • KANSAS CITY, MO. • LOS ANGELES • MILWAUKEE
NEWARK • NEW YORK CITY • PHILADELPHIA • PITTSBURGH
RICHMOND • ST. LOUIS • SAN FRANCISCO • SEATTLE
TORONTO, ONT., CAN. • EXPORT DIVISION, NEW YORK CITY

Concrete Vibrators—the Remington line offers you more models!

(GASOLINE, AIR, ELECTRIC POWERED)

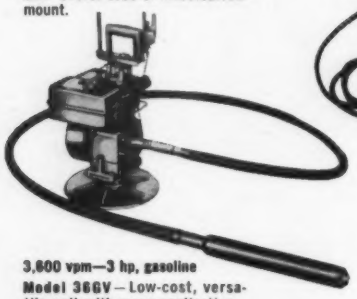


7,000 vpm and 10,000 vpm—5¼ or 8¾ hp, gasoline

Model 7GV and 10GV—V-belt pulley drive gives 3,600 to 10,000 vpm. 360° swivel base or wheelbarrow mount.

10,000 vpm—1 hp, electric

Model 1EV — 115 volt, ac/dc. Weight with 2-ft. shaft only 23 lbs. Shafts up to 14 ft. Handy switch.



3,600 vpm—3 hp, gasoline

Model 36GV — Low-cost, versatile unit with many applications. Choice of heads: 1⅞" or 2⅛" diam. head. Swivel base.

10,000 vpm—1½ hp, electric

Model 2EV — 115 or 230 volt, ac/dc. Weight, 27 lbs. with 2 ft. shaft. Shafts up to 14 ft., 1¼", 1⅞" and 2⅜" diam. head.

10,000 vpm—1¾ hp, air

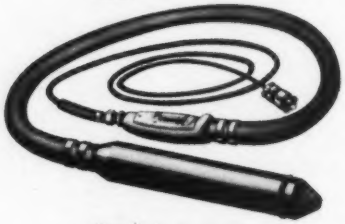
Model 2PV — 10,000 vpm at 90 psi. Operable by one man. Built-in oiler, handy throttle. Choice of heads: 1¼", 1⅞" and 2⅜" diam. head.

10,000 vpm—2 hp, electric

Model 3EV — 115 or 230 volt, ac/dc. Capacity, 35 cu. yds. of concrete per hour. Choice of heads: 1⅞", 2⅜" or 3¼" diam. head.

10,000 vpm—3½ hp, air

Model PV-24 — 10,000 vpm at 90 psi. Heavy-duty motor with automatic oiler. Head: 2½" diam. head. Weight only 30 lbs.



Motor-in-head—electric

Model EV26—115 volt, ac at 25-60 cycles. 2⅜" diam. head with built-in motor. Thermal overload switch prevents burnouts.

Remington has the most complete line of vibrators on the market—gasoline, air and electric powered... and most shafts, heads and accessories are interchangeable from model to model. This means you can get big savings if you standardize on Remington concrete vibrators.

Specifications subject to change without notice.

In Canada: Remington Arms of Canada Limited 36 Queen Elizabeth Blvd., Toronto 18, Ont.

FREE BOOKLET — Illustrated catalog shows the complete line of Remington vibrators and lists specifications and performance data. Write for it at the address below.

Remington
CONCRETE VIBRATORS
DU PONT

Remington Arms Company, Inc., Dept. CC41 25000 So. Western Avenue, Park Forest, Ill.

books

Manual of Recommended Practice for Concrete Floor Finishes. *Published by The Concrete Industry Board, Inc., 220 East 42 Street, New York 17, N. Y. 15 pp. $1.00 per copy, with 10 percent discount on 25 or more copies.*

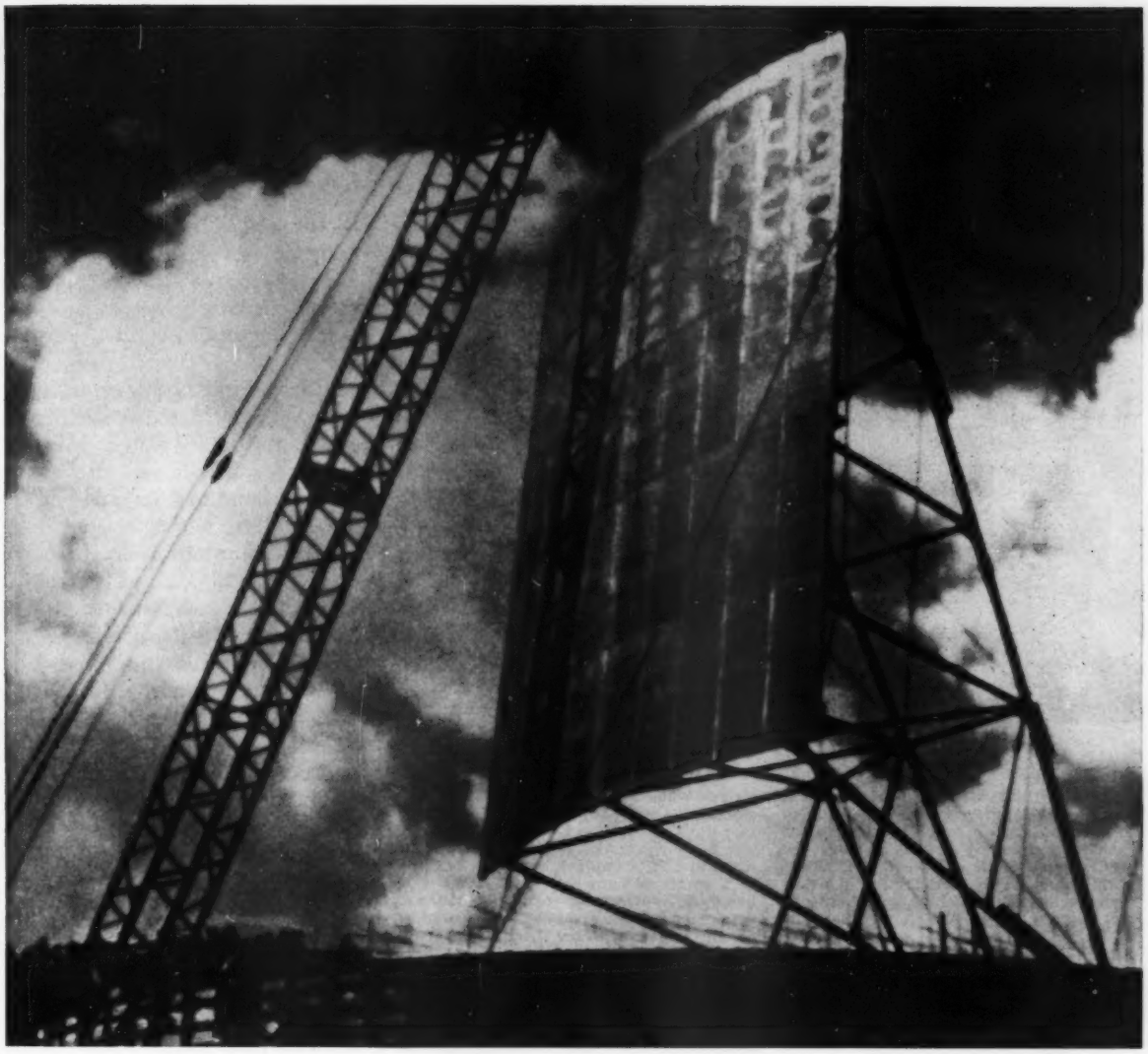
This manual, prepared by the Committee on Concrete Finishes, is written in a concise and easily read format and contains a wealth of practical information about concrete floor finishes. The subjects covered include monolithic finish, integral topping, bonded topping, heavy duty integral or bonded topping, non-slip floor surfaces, exposed aggregate finishes, floors subject to special conditions, colored finish floors, joints, and tolerances.

The booklet represents an effort to help the industry to obtain concrete floors with uniform wearing qualities and to eliminate unsatisfactory faults such as severe dusting, excessive wear, cracking, crazing, spalling, or separation of topping from structural slab which are so often encountered.

Design of Prestressed Concrete Beams. *By William H. Connolly. Published by F. W. Dodge Corporation, 119 West 40th Street, New York 18, N. Y. 252 pp. Illus. $11.50.*

This book presents a rational and clear-cut method for designing pretensioned and post-tensioned concrete members from a strictly practical point of view. It covers the most difficult and time-consuming aspect of prestressed concrete design: selecting the cross section.

The author places major emphasis on elastic design for bending, gives consideration to prestress losses, shear, and ultimate flexural strength, and uses



4 Ton Ganged Section, 22 Ft. by 28 Ft. Used for . . .

28′ High Circular Walls of Sewage Plant

Friebel & Hartman, Shelby, Ohio contractor, was able to strip and reset 2,300 square feet of forms on the inside gang section in 3½ hours. A ¾ yard crane with an 80′ boom handled the sections. 8 men in less than 8 hours erected 2,300 square feet of forms and scaffolding on the outside, plus pouring the concrete. The project was the Mansfield, Ohio Sewage Treatment Plant, which consisted of four digestors, each 80 feet in diameter, 28 feet in height and 8 inches thick with no horizontal joints.

Four ganged sections were used—each 22 feet wide and 28 feet high. This allowed pouring ⅓ of a tank at a time, and a pour every four working days. Weight of each ganged form section was about four tons. By using three trusses to brace each ganged section contractor was able to hold bracing costs to a minimum.

Complete story on the Ohio Sewage Treatment Plant will be sent *free* upon request. Symons Steel-Ply Forms can be rented with purchase option.

Symons CLAMP & MFG. CO.

4271 Diversey Avenue Dept. D-1 Chicago 39, Illinois

Warehouses Throughout the U.S.A.

the report of ACI-ASCE Joint Committee 323, "Tentative Recommendations for Prestressed Concrete," as a guide in considering these important factors. The book contains over 120 tables, charts, and diagrams applicable to I-beams, T-beams, long-span members, and composite sections. Uniquely practical, these tables are adaptable to members of any proportions and dimensions. Through the use of these tables, the designer can reduce the tedious trial and error normally involved in designing these members. This is an indispensable handbook for structural engineers, professors of engineering and architecture.

Darex Diary

by Mel Prior
Member, American Concrete Institute
Technical Service Manager, Construction Chemicals

GRACE W. R. GRACE & CO./ DEWEY AND ALMY CHEMICAL DIVISION
Cambridge 40, Mass. • Chicago 38, Ill. • San Leandro, Calif. • Montreal 32, Canada

(No. 20 of a series)

FREEZE-THAW TESTING NOW AUTOMATED

TESTING THE EFFECTIVENESS of entrained air in combating freeze-thaw damage to concrete has come a long, long way in the past few decades. By all odds, however, the most important step forward ever taken in this phase of concrete testing is a new "weathermaking" machine for laboratory use, the Conrad Freeze-Thaw Chamber. To help you appreciate its importance, let's go back and take a brief look at some of the stages of development in freeze-thaw testing.

Back in the days when no ASTM test methods for evaluating freeze-thaw resistance were available, we resorted to a pretty basic technique. Solid concrete blocks were cast in a special mold to provide a dam which would hold calcium chloride solution on the surface of the concrete. These blocks were then set on racks in an area outside the lab to let nature take its course. New England weather enabled us to record an average of 40 cycles of freezing and thawing in a season. This was a slow process and in many instances, it took more than one season to come up with any significant results.

The next step was to develop a laboratory method, using a cold-storage chamber for freezing, which gave us some control of the cycles. This method was essentially the same as the present ASTM Designation C 292. During the first few years, it was necessary to rely on visual examination of the specimens, and/or weight loss for evaluation. However, this technique served its intended purpose in many thousands of tests.

Late in the 1930's, the use of sonic vibration was suggested. We constructed several sonic modulus units for use in other laboratories, as well as in our own, and this method of comparing specimens proved to be a major advance in the development of nondestructive testing of concrete.

Now, however, the new and completely automatic Conrad Freeze-Thaw Chamber recently added to our laboratory facilities opens a whole new era of testing speed and efficiency. One of the few privately owned machines of its kind anywhere in the world, this apparatus will produce as many as eight complete freeze-thaw cycles in a single 24-hour day. Each cycle will bring the interior temperatures of the test specimens from 40F. to 0F. to 40F. Thermocouples imbedded in the specimens deliver interior temperature readings. Test series can be completed in twenty to thirty days instead of the ten to fifteen months required by earlier methods.

New Conrad Freeze-Thaw Chamber in operation at Dewey and Almy concrete testing laboratory.

The unit is capable of automatically duplicating cycles in compliance with all four ASTM designations, C 290, C 291, C 292 and C 310. Controls can be adjusted to obtain practically any combination of time-temperature cycles. This flexibility permits investigation of many types of cycles which may, in some ways, more closely approach those actually encountered in the field.

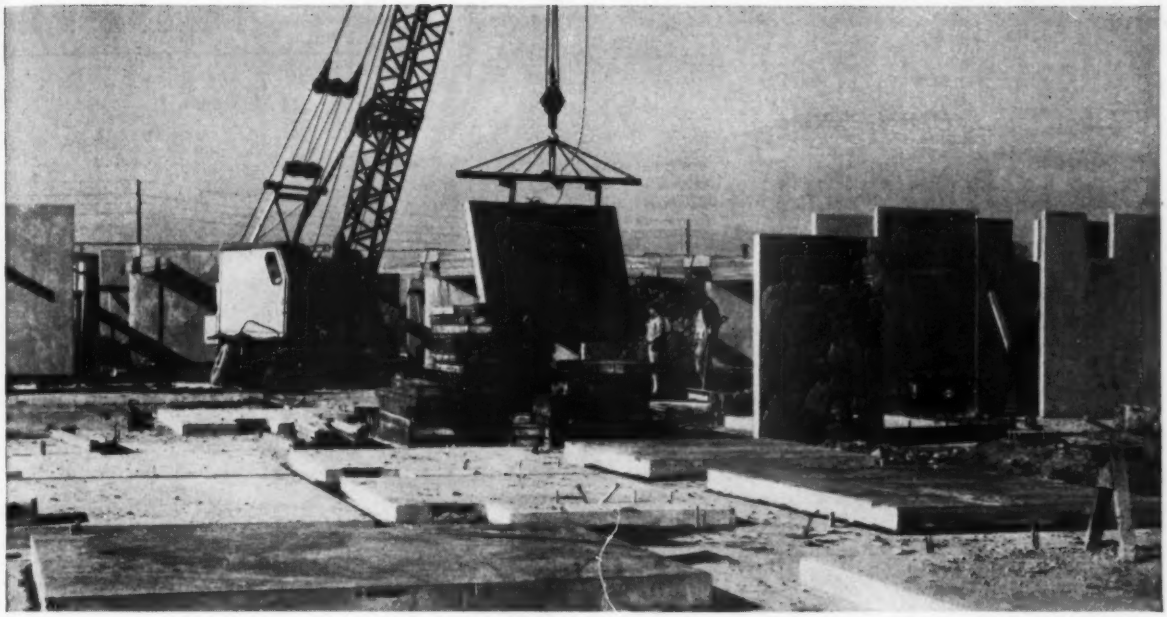
Thus, this new "weathermaking" machinery will serve as an important research tool, as well as a superior testing facility for investigating concrete performance under standard ASTM conditions.

In Praise of Architecture. *By Gio Ponti. Translated by Mario and Giuseppina Salvadori. Published by F. W. Dodge Corporation, 119 West 40th Street, New York 18, N. Y. 270 pp. Illus. $6.95.*

Whether your interest in architecture stems from a professional concern, an allied interest, or simply from a lively curiosity about our contemporary culture, you should find this book rewarding reading. The author is an Italian architect. He is also an artist, author, poet, editor, publisher, and a devout man of faith. From his studio in Milan, he designs buildings for the major cities of the world, is consulted by architects from many countries, and plays an additional role as a noted industrial designer. The book is a collection of highly personal observations on architecture and modern life. In 52 stimulating and entertaining chapters, the author explores and reflects upon the many, and often controversial, aspects of a demanding art. Of the book he says, "It was not written to lay down laws but rather to encourage debate." His sparkling commentaries are, indeed, of the kind that will promote discussions and even heated arguments beyond the confines of the architectural profession.

Residential Building Sewers. *Published by Building Research Advisory Board, National Academy of Sciences—National Research Council, 2101 Constitution Avenue, Washington, D. C. $2.00.*

This new report deals with the use of pipe made from six different materials—asbestos-cement, bituminized fiber, cast iron, concrete, plastics, and vitrified clay—and the jointing methods and materials and installation procedures used with each. Also treated are plumbing codes, existing standards, causes of failure, and needed inspection and maintenance procedures.



Note pleasing masonry appearance of exterior tilt-up slab in foreground. Panels were erected by crane, using a special strongback that holds the slab by lifting eyes screwed into inserts in the slab. An extra cable from the crane pulled panels perpendicular.

New things are being done with ready mixed concrete

Flagstone faced panels, site-cast and tilted up, give masonry appearance at low cost in residential building

For a home for the aged, a pleasing exterior was achieved with tilt-up economy by the simple expedient of casting flagstones in the face of the wall slabs. These panels alternate with window-wall construction. Corridor walls are plain tilt-up slabs.

179 panels (8′ x 12′ x 8″ for exterior, 10′ x 12′ x 6″ for interior) were cast on the 4″ floor slab. Before casting the exterior panels, the flagstones were imbedded in sand. After the sand was wetted, a ½″ layer of mortar was placed to serve as a form for the concrete and to hold the flagstones in place. Ready mixed concrete, a 6-sack mix designed for 3,000 psi at 14 days, was then poured over two layers of 6 x 6 — 6/6 wire mesh.

Corridor panels were poured similarly, using a bond-breaking agent applied to the floor slab 5 hours prior to pouring and again immediately before the pour. Electrical conduits were wired to the reinforcing mesh of corridor panels, with outlet boxes capped on wood blocks nailed to the floor.

Panels were erected by crane and secured to the floor by welding plates. Laminated wood beams were set in place after panel erection. A 4-ply built-up roof with white sand topping was placed on this wood decking.

FLAGSTONES were imbedded about 1″ in a layer of sand, with 1″ to 2″ gaps between stones.

CASTING of the 179 tilt-up panels was carefully controlled to avoid shrinkage cracks. Corridor panels were notched to receive roof beams which span 42′. Contractor: Wolf Construction Co., Logansport, Ind. Architect: Henry C. Wolf, Logansport and Champaign, Ill.

You have a right to insist on this Rating Plate. It certifies compliance with the high industry standards which are maintained for your protection by the

TRUCK MIXER MANUFACTURERS BUREAU

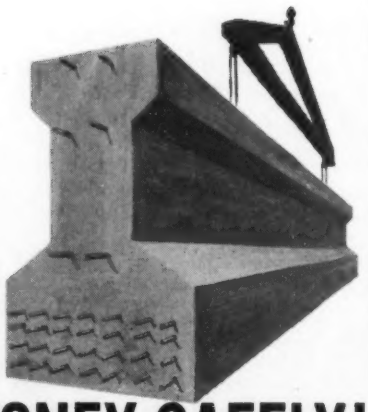
Blaw-Knox Company
Pittsburgh, Pa.
Chain Belt Company
Milwaukee, Wis.
Challenge—Cook Bros., Inc.
Los Angeles, Calif.
Concrete Transport Mixer Company
St. Louis, Mo.
Construction Machinery Company
Waterloo, Iowa
Hercules Galion Products, Inc.
Galion, Ohio
The Jaeger Machine Company
Columbus, Ohio
The T. L. Smith Company
Milwaukee, Wis.
Whiteman Manufacturing Company
Pacoima, Calif.
Willard Concrete Machinery Co., Ltd.
Lynwood, Calif.
Worthington Corporation
Plainfield, N. J.

Dependable

Richmond

products for

prestressed concrete



SAVE TIME & MONEY SAFELY!

Richmond Strand Deflection and Push Down inserts for depressing strands. Special units can also be manufactured to suit individual needs.
Richmond Chairs and Spacers for void supports and spirals in prestressed piles and beams.
Richmond Inserts for connection of cast-in-place diaphrams to prestressed girders.
Richmond inserts for anchoring to or hanging from prestressed members.
Richmond Extended Coil Tyscrus for lifting prestressed beams and girders. (2 & 4 strut)
Richmond inserts for anchoring guard rails to prestressed girders.
Phillips Self-drilling Concrete Anchors for anchoring to any concrete members after concrete has set.
Richmond Offset Free-Fit Hanger Frame-Tys used to hang forms from prestressed "I" beams.
Richmond's Columbia-matic "8", fully automatic stud fastener for secure and safe fastening into concrete.

Shown here are a few of the many Richmond-engineered products for the prestressed concrete construction industry. For more information about them, or help with any specific concreting problem, write to:

Richmond
SCREW ANCHOR CO., INC.
INSIST ON RICHMOND
AND BE SURE IT'S RICHMOND
ASSOCIATE MEMBER PCI

MAIN OFFICE: 816-838 LIBERTY AVENUE, BROOKLYN 8, N. Y.
SALES OFFICES, PLANTS & WAREHOUSES: FT. WORTH, TEX. ATLANTA, GA.—LAUREL, MD.—ST. JOSEPH, MO.—WALTHAM, MASS. **IN CANADA:** ACROW-RICHMOND, ORANGEVILLE, ONT.

1911-1961 *50 YEARS OF PROGRESS*

letters

retarding admixtures

Sir:

The illustrated spreads in your January issue on cold weather and hot weather concreting deserve a laurel wreath. They are graphic condensations of the ACI (Committees 604 and 605) recommendations on concreting, with the added virtues of simplicity and brevity. Where the busy engineer would have little time to read, let alone assimilate the ACI reports, your reduction of their essential contents to thumb nail dimensions should put every concrete engineer in your debt. They can really be read on the run.

Having said this, however, there is one observation which as a manufacturer of chemical adjuncts in construction, I am impelled to make. Where in the cold weather summary, an accelerating admixture is recommended, there is nothing in the hot weather inventory which even remotely suggests that retarding admixtures are available and in ever widening use. Indeed the recognition of such admixtures as a specific for summer concreting difficulties is reflected in their increasing appearance in architectural specifications and in field use. In fact the U. S. Bureau of Public Roads made an extensive study of retarders for hot weather concreting and promulgated a proposed specification. That these admixtures extend and insure the effectiveness of the other measures listed in your article has been the experience on many projects.

EMANUAL ROSENBLAT
President
Arlin Chemicals
Carlstadt, N. J.

SEALTIGHT®

PRODUCTS SPECIFIED TO WATER-PROOF AND VAPOR-PROOF CHICAGO'S NEW $35,000,000 EXPOSITION CENTER

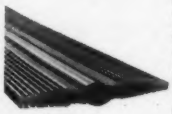
Premoulded Membrane TRADEMARK VAPOR SEAL

... was used to effectively isolate the structure from the site, thereby eliminating moisture migration into the structure and the resulting problems of excessive moisture.

CORKTITE TRADEMARK

... Impermeable Perimeter Insulation was used at strategic locations to effectively eliminate heat loss now and for the life-time of the structure.

PVC WATERSTOPS



Sealtight PVC Waterstops were used in the construction and expansion joints of McCormick Place to provide a permanent barrier against water ingress under hydrostatic pressure.

Premoulded Membrane TRADEMARK

Guaranteed by Good Housekeeping

THE ORIGINAL TRUE VAPOR SEAL

McCORMICK PLACE

ARCHITECT: Alfred Shaw, Chicago, Illinois
CONSULTANTS: Carl A. Metz, John Dolio and John Root, Chicago, Illinois; Edward D. Stone, New York; John Ditamore, Lafayette, Indiana; and Fred Schmid, Los Angeles, California
GENERAL CONTRACTOR: Gust K. Newberg Construction Co., Chicago, Illinois

Magnificent is the word for McCormick Place ... the largest and finest exposition center in the world. Larger than the Coliseum of ancient Rome ... designed by twentieth century experts and built with the latest and best of building materials to endure longer than the Pyramids of Egypt. Because of the lakefront location special attention was given to the selection of products to be used to waterproof and vapor-proof this outstanding structure. We are justifiably proud that the Sealtight Products (left) were used to provide this important protection against moisture migration. McCormick Place is now one more of the thousands of important architectural structures that have been moisture-protected with Sealtight products.

SEALTIGHT®
PRODUCTS FOR BETTER CONSTRUCTION

W. R. MEADOWS, INC.

29 KIMBALL STREET
ELGIN, ILLINOIS

WRITE TODAY FOR DESCRIPTIVE LITERATURE

ONE SOURCE for EVERY FORMING REQUIREMENT!

make more money on

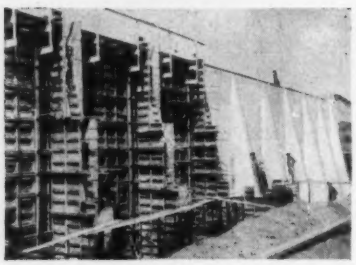
Home Foundations and Light Commercial Work with

THE WORLD'S FASTEST METHOD — Simplex FOOT-A-MINUTE forms — OF CONCRETE FORMING

Save time and work! This is a complete system with patented locking hardware bolted to panels . . . no danger of losing vital parts. Inner and outer forms go up simultaneously . . . accuracy maintained through positive lever action that "pulls" forms tightly together. Simplex forms bring about more profit whether used above or below grade . . . on residential projects or light commercial construction.

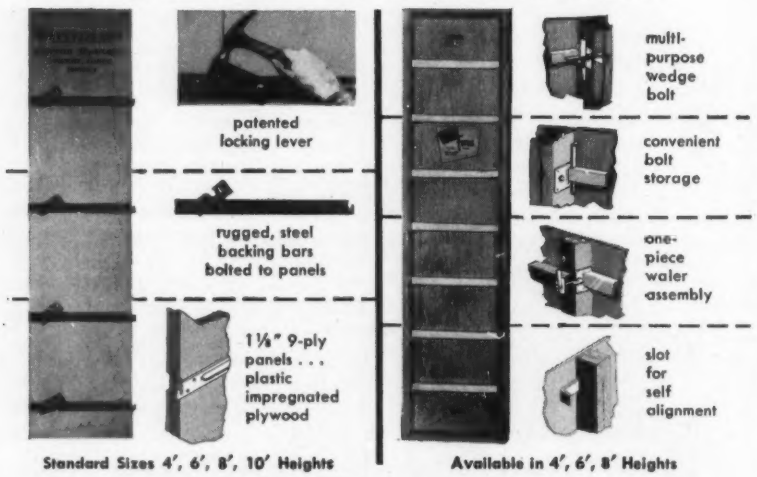
Heavy Construction Jobs . . . Above or Below Grade with

Simplex Waco



Typical of Simplex-Waco flexibility is this 32' battered wall with counterforts! Adaptability of forms permitted horizontal and vertical arrangements . . . use with Robertson Q. panels to produce an architectural finish. Simplex-Waco forms are easy to handle . . . quick to assemble . . . are self-aligning through special alignment slot. Simplex-Waco forms available on sales or rental/purchase plan.

DISTRIBUTORSHIPS OPEN IN CHOICE AREAS


patented locking lever
rugged, steel backing bars bolted to panels
1⅛" 9-ply panels . . . plastic impregnated plywood
multi-purpose wedge bolt
convenient bolt storage
one-piece waler assembly
slot for self alignment

Standard Sizes 4', 6', 8', 10' Heights

Available in 4', 6', 8' Heights

Send your specifications for free Layout and Estimate

SIMPLEX FORMS SYSTEM, INC.

5603 Industrial Avenue

Rockford (Loves Park) Illinois

letters

lightweight concrete

Sir:

I am delighted to see that you are running a series of articles on lightweight concrete, beginning with the January issue of Concrete Construction. We too feel the necessity of doing something to familiarize the industry at large with the many advantages of lightweight concrete and your articles are timely from our point of view.

I have not had an opportunity to carefully study the articles to date, but I was somewhat startled by the opening statements which appeared in the first article. If they raised an element of doubt in my mind they may in others also.

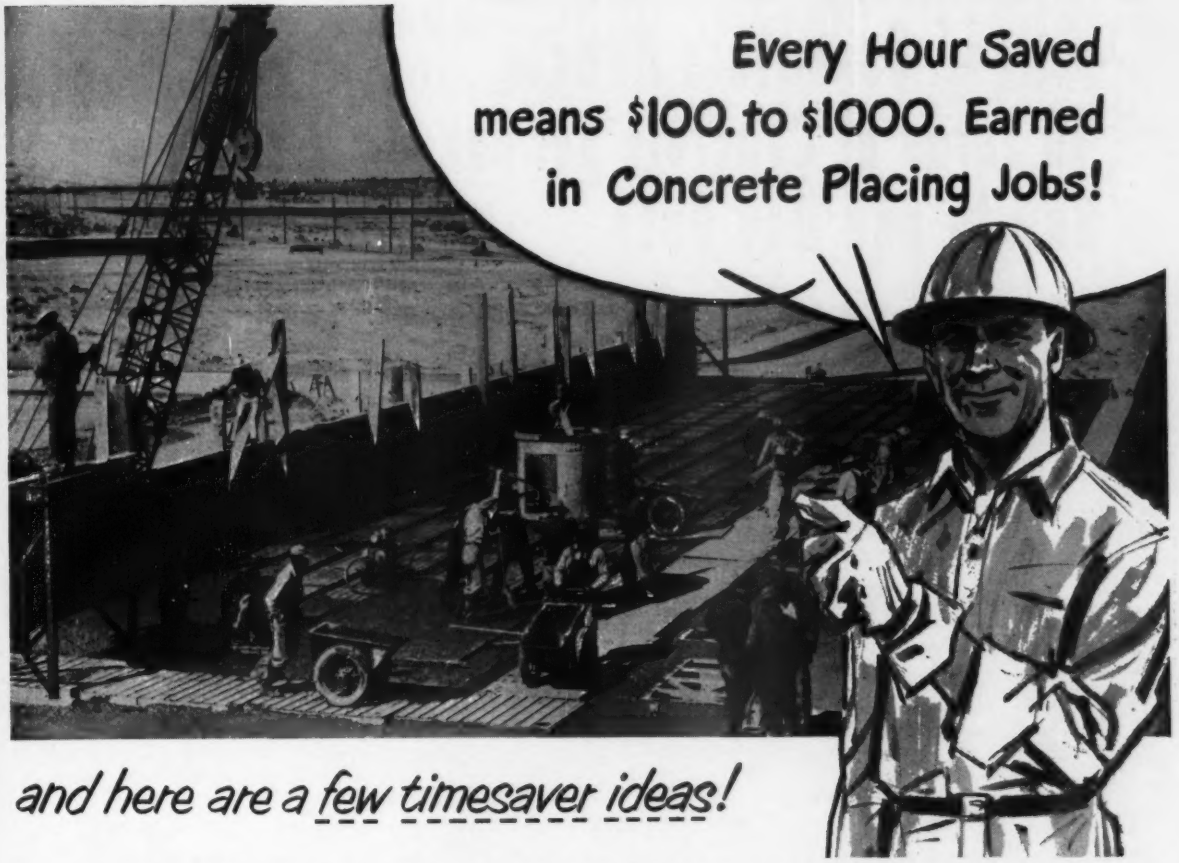
I am a little confused by the statement in the first paragraph: ". . . As builders have come to realize that savings in weight can equal savings in total cost, . . ." Should not the words "can result in corresponding" be substituted for the word "equal"?

Similarly in the third paragraph, "Lightweight concrete pays dividends from the second story up." Why not all the way?

Also in the third paragraph: "Plans for a Cleveland department store, for example, at first called for three stories; but due to the use of lightweight concrete, ten more floors were added." Does this mean that thirteen floors were provided at the original cost of three? Were the needs of the department store so indefinite in the beginning that the store multiplied three and a third times in volume?

In the fourth paragraph the percentages of savings in structural volume and total weight

(*Continued on page* 112)



Every Hour Saved means $100. to $1000. Earned in Concrete Placing Jobs!

and here are a few timesaver ideas!

Team up equipment to prevent delays which keep men idle—equipment costs are much less than lost man hours.

Use two or even three concrete buckets on a pouring job. While the crane spots one bucket and the concrete is being dumped, the other bucket can be filled, thus you can almost double output by eliminating waiting time between bucket loadings.

Accordion Hopper attachments on Gar-Bro Concrete Buckets guide concrete into narrow wall forms —prevent spillage and speed up the placing job.

When placing concrete in piers, use two or three collection hoppers with flexible steel drop chutes to direct concrete without segregation. Thus you can rotate the chute lines and shorten one line while the other is in use. This will eliminate delays of the bucket and crane and transit mix trucks.

Use Receiving Hoppers, either floor hoppers or portable hoppers for intermediary storage of concrete. Thus you keep a steady supply of concrete and prevent stoppage of the cart crew. At the same time you eliminate delays of transit mixers.

Supply your men with carts that are designed for handling concrete — Gar-Bro Concrete Carts — they are *balanced when fully loaded;* are easy to handle, easy to dump.

Concrete placing has become a science in the past ten years and, today, in the contracting business only careful planning and proper equipment can guarantee adequate profits.

See your Gar-Bro dealer for suggestions and methods of handling concrete or write for Gar-Bro's Concrete Handling Manual. **Gar-Bro Mfg. Co., Los Angeles, Calif. • Peoria, Ill.**
General Offices: 2415 E. Washington Blvd., Los Angeles 21, Calif.

GAR-BRO

The World's Most Complete Line of

CONCRETE HANDLING EQUIPMENT

the big break-through in concrete handling:

Morgen Conveyors Handle 40 Yards of Concrete per hour Day In and Day Out!

More Concrete than a Crane with ¾-Yard Bucket —at 1/10th the equipment cost—with fewer men

The only contractors who still think "conveyors aren't for concrete" are those who haven't seen a Morgen in action. Once they see 550 yards in one continuous 15-hour pour, once they talk to men who've used Morgen conveyors for years, once they see the savings in cost and manpower, they get themselves converted!

Here, for the first time, is a conveyor designed from the ground up for concrete, eliminating the bugaboos of early belt conveyors. The direct-coupled hydraulic drive gives complete control, free of adjustments, immune to operator negligence.

Easily Moved About on the Job

A balanced design lets Morgen build a heavy duty conveyor that is light enough to move easily on the job, even when elevated to 45° or on muddy ground.

Choice of Lengths and Styles

Morgen Conveyors are fully portable in lengths up to 48', discharging up to 33' high. In addition to the self-training idler roller conveyor shown, a lower cost pan-type conveyor is available with all the Morgen features and reverse drive as well.

Belt and idler width is matched so material wider than the belt can be handled.

WRITE FOR LITERATURE OR DEMONSTRATION

MORGEN MANUFACTURING CO.
DEPT. C YANKTON, S. D.
The makers of Morgen Adjustable Masonry Scaffolding

letters

are interesting, if true, but I should like to see the percentages definitely established.

Please accept the foregoing comments in the spirit in which they are written and not as criticisms because we are looking at the problem with the same objective viewpoint. I want to be able to answer any questions the articles may develop with the conviction in my own mind that they are correct.

JOHN J. MANNING
Managing Director
The Concrete Industry Board
New York, N. Y.

Concrete Construction is appreciative of Admiral Manning's comments and would welcome any information from other readers which will clarify the questions he raises.

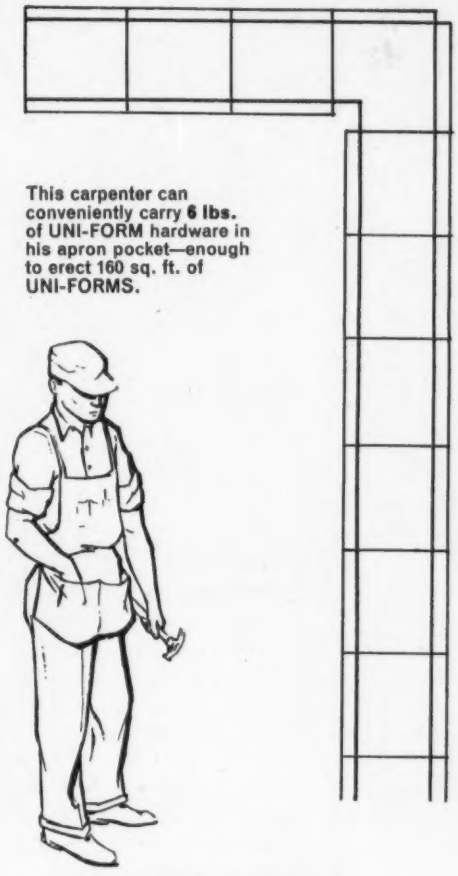
The first point is well taken. What our writer undoubtedly meant to suggest was that there was a close relationship between the percentage reduction in cost and the percentage reduction in weight.

As to the statement that lightweight concrete pays dividends from the second story up, this is founded on the quite general observation that there is little real economy to be gained in reducing the weight of a single story structure. Indeed, some builders feel that the possibilities of savings are introduced only in structures more than two stories in height.

The point of the Cleveland department store incident was that the dead load reduction resulting from the use of lightweight concrete for what was originally planned as a three story structure eventually made it possible to erect a much taller structure within the same land area available for constructing foundations. Here, again, our writer's statement lacks clarity. We, too, question the apparent lack of planning which went into this project.

EDITOR

WHICH PREFAB FORM SYSTEM OFFERS MORE PRODUCTIVE FORMING TIME PER DAY?



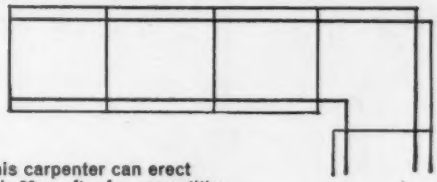
This carpenter can conveniently carry **6 lbs.** of UNI-FORM hardware in his apron pocket—enough to erect 160 sq. ft. of UNI-FORMS.

UNI-FORM SYSTEM

Carpenters can form more contact area per hour with UNI-FORM Panels than they can with any other prefab form system. The reason? It takes less hardware — in most cases, 50% less — to form a given contact area. And UNI-FORM hardware **weighs less, costs less,** and is easier to install.

EXAMPLE: **6 lbs. of UNI-FORM hardware — 128 Tie Keys — are required to install 32 UNI-FORM Ties (4 keys per tie).** 32 Ties are required to erect 160 sq. ft. of UNI-FORM Panels.

Cost of hardware required to install 1 UNI-FORM Tie: **LESS THAN 4¢.**
(Tie Keys are re-usable)



This carpenter can erect only 60 sq. ft. of a competitive prefab system's panels with the **6 lbs.** of hardware he carries in his apron. **Extra trips for hardware means less productive forming time.**

COMPETITIVE PREFAB FORM

A leading competitive prefab form system requires 2 tightening wedges and 2 connecting bolts per tie installed. **In 6 lbs. of this hardware, there are only 24 sets of wedges and bolts — enough for 12 ties.** 12 ties will assemble **only 60 sq. ft.** of this system's panels.

Cost of hardware required to install 1 competitive tie: **36¢.**
(Wedges and Bolts are re-usable)

WHICH PREFAB FORM SYSTEM GIVES YOU FASTER FORM ERECTION AND LOWER COSTS? Want more information about UNI-FORM Panels and the advantages they can bring to your concrete forming? Write today for complete details.

UNIVERSAL FORM CLAMP CO. 1238 N. KOSTNER AVENUE • CHICAGO 51, ILLINOIS

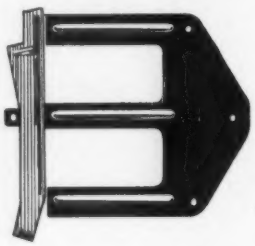
BRANCH OFFICES and WAREHOUSES:
ATLANTA BALTIMORE CLEVELAND HOUSTON
LOS ANGELES SAN LEANDRO TORONTO

Save Time... Save Money...

with BURKE CONCRETE ACCESSORIES, INC.

SAFETY IN STRENGTH

WORLD'S LARGEST STOCK OF VARIED ITEMS FOR CONCRETE CONSTRUCTION



VINES WALER BRACKET

The MODERN method of supporting walers on wood forms designed and engineered to give maximum performance and safety.

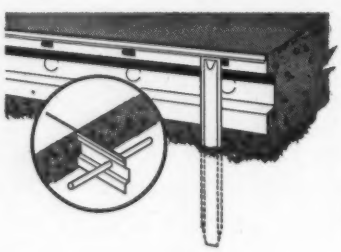
Vines Waler Brackets successfully support, space and retain walers independently of wall ties or clamps without toe nailing to studs and meet the requirements of the contractors and the safety engineer.

BURKE HANDY REEL

- Solid continuous aluminum frame.
- Self locking pin.
- Reversible belt loop for right or left hand workers.

Finger tight screw means:

No wrenches to use . . . no parts to lose . . . no threads to strip. Easy to rewind.



KEYED KOLD JOINT FORMS

A new concrete construction product that serves as form, screed, and true cold joint, left permanently in the concrete floor slab. The use of Keyed Kold Joint eliminates spalled joints . . . produces a cold joint structurally sound and architecturally beautiful. Keyed Kold Joint also eliminates costly make-up and stripping of split forms for checkerboarding. Saves up to 35% in cold joint form costs . . . results in neater, uniform joints.

TO ORDER ANY OF THE ABOVE ITEMS OR FOR FREE BROCHURES & SPECIFICATION SHEETS USE COUPON BELOW.

BURKE CONCRETE ACCESSORIES, INC.

2690 Harrison St., San Francisco 10, California

(Clip and Mail)

BURKE CONCRETE ACCESSORIES, INC.
2690 Harrison St., San Francisco 10, California

Please Send Me the Following:

☐ Free Brochures
☐ Sample Spec. Cost
☐ 1. Vines Waler Bracket
☐ 2. Burke Handy Reel
☐ 3. Keyed Kold Joint Forms

Your Name_____

Firm Name_____

Address_____

City_____ Zone_____ State_____

airport wins achievement award

New York—New York International Airport has been selected by the American Society of Civil Engineers for its 1961 award as the Outstanding Civil Engineering Achievement of the Year. It was one of eleven nominations made in the competition, which in 1960 was won by the St. Lawrence Seaway and Power Project. The jury decided that the civil engineering involved is of a magnitude unprecedented in the history of airport planning, design, and construction.

The airport, which was started about 20 years ago, is now about 75% operational. Work is still proceeding to complete the construction program.

a little ice lets concrete down easy

Washington D.C.—It's been done before, but it's rare enough to be unusual—the use of blocks of ice to aid in moving concrete forms. This method was used near the nation's capitol by the Cooper Engineering Co. in construction of a culvert-type bridge structure over a small creek. A single movable form was used with big wooden trusses resting on a movable sill above a permanent sill. When the concrete had set, the form was dropped onto steel rollers on which it was moved to the next location. To drop the heavy form two inches without damage, the contractor employed large blocks of ice placed under the form sill. Wooden blocks on which it rested for the concrete placing operation were knocked out. The melting ice then let the structure down two inches onto the rollers and it was moved to the next location, where the forms and sill were again jacked up into position. Two hours were required for the melting operation.

Owner: Federal Aviation Agency; **Consulting Engineer:** Ammann & Whitney, New York, N.Y; **General Contractor** runways and turnoffs: C. J. Langenfelder & Sons, Inc., Baltimore, Md.

Concrete at new Dulles International Airport, Chantilly, Virginia, was centrally mixed and carried to the site in dumpcrete trucks.

High Speed paving with PLASTIMENT

Concreting the two-mile runways at the huge new Dulles International Airport near Washington, D. C., presented two major problems to the paving contractor: (1) limited workability at specified water cement ratio, and (2) rapid surface drying at high summer temperatures. Anticipating these problems, the consultants specified a retarding densifier to be used in variable proportions.

Plastiment Retarding Densifier produced the needed workability at 1-1/2" slump. Rapid, clear-water bleeding eliminated premature drying and provided sufficient moisture at the surface of the slab for proper finishing.

Compressive strength developed rapidly, averaging 2300 psi at 24 hours and 4200 psi in 3 days.

Plastiment features are fully detailed in Bulletin PCD-59. Ask for your copy. Offices and dealers in principal cities; affiliate manufacturing companies around the world. In Canada, Sika Chemical of Canada, Ltd.; in Latin America, Sika Panama, S. A.

Sika

SIKA CHEMICAL CORPORATION

Passaic, N. J.

Ends Wading in the Mix!
New!
Goldblatt
ROLLER BUG
Tamps and levels in one operation!
16 652 E5
$48.50
COMPLETE
ENDS HAND-TAMPING! IMPROVES SLAB QUALITY
PROVED BEST: Rollerbug® depresses large aggregate to leave a thin 1/32" to 1/16" layer of fat on the slab for ideal finishing or a key for two-course work.
LEVELS AS IT ROLLS: The 36" wide, 5" diam. rollers level the slab as they depress aggregate! No other tool does this.
ENDS WADING IN THE MIX: With 6' or longer magnesium extension handle you "roll" the slab from the side. Works quickly, like a float.
TROUBLE FREE: No moving parts but the rollers. Saves its cost in labor on the first few jobs.
SATISFACTION GUARANTEED OR YOUR MONEY BACK!
Order Direct from us . . .
Or your Favorite Goldblatt Dealer
Goldblatt TOOL COMPANY
1958 Walnut Street / Kansas City 41, Missouri

concrete vs steel frames for multi-story dwellings

New York, N. Y.—The Concrete Industry Board of New York, reports that the economy of reinforced concrete frames vs steel frames for multi-story dwellings has had another go-around, with the usual result.

Some time ago the Woodrow Wilson Housing Project in this city was designed in reinforced concrete frames. Steel interests made available, without charge, a design and plans to permit alternate bids on steel frames. The bids received were definitely favorable to concrete and the project has been successfully and satisfactorily constructed of concrete.

Despite the foregoing, alternate bids were requested for reinforced concrete and steel frames on the Borgia Butler Housing Project, New York.

Opening of bids on January 17, 1961 produced the following:

Concrete Frame Bid (A)	Steel Frame Bid (B)	Difference in Favor of Concrete
$8,107,000	$9,800,000	$1,693,000
8,428,000	8,844,540	416,540
8,547,000	9,700,000	1,153,000
8,548,550	9,748,550	1,200,000
8,583,000	9,430,000	847,000
8,673,000	9,795,000	1,122,000

It will be noted the cost of steel frames in each bid exceeded the cost of concrete frames, despite the low bid for steel being well below the average of the steel bids. The average bid for steel frames exceeded the average bid for concrete frames by 10.13%. Disregarding the extremely low individual bid for steel, this average becomes 11.4%.

It is rumored that the Simkhovitch Housing Project (Corlears Hook) now on the drafting boards, also will provide for alternate bids for concrete and steel frames.

concrete industry groups flourish

Recognizing the need for continued interchange of knowledge, ideas and experiences in the concrete industry, organizations continue to develop and flourish. The newly formed Mid-West Concrete Industry Board Inc. in Kansas City now has a Board of Directors of twenty-four members, and a total membership in excess of one hundred. Their active committees include: *building code, program,* and *ready mix.* At their monthly membership meetings, prominent speakers are on hand to discuss some subject of general interest to the members.

Hugh Kirkland (Right), President, Kirkland Masonry, Inc., Miami, Fla., talking to Dick Rogers, his Dodge Representative.

"Last year, we got over $4,400 in new business for every dollar we invested in Dodge Reports"

"Dodge Reports actually doubled our business in 1959, the first year we used them," says Mr. Kirkland. "And we doubled that increase last year!" Mr. Kirkland concentrates in the competitive south and central Florida markets. When he decided that his firm could realize its maximum growth potential only by actively competing for more commercial, industrial and residential contracts, he began using Dodge Reports. "We knew," he says, "that unless we kept ahead of the latest developments in these markets, contracts would be awarded to our competitors before we even heard of the jobs." In the two years since that decision, his firm has captured over $3-million in new business – most of it commercial and industrial contracts that he couldn't even have bid on without Dodge Reports. Today, he is one of south Florida's leading masonry contractors.

Daily Dodge Reports tell Mr. Kirkland all he needs to know: type of project and cost, names of owners, architects and engineers, names of general contractors bidding, results of the bidding, and award of the general contract. "We have to be there with a bid *before* the general contract is awarded because the GC has to incorporate our bid in his," Mr. Kirkland says. "Dodge Reports give us the facts we need *in time* to figure the job and get it!"

Dodge Reports can get new business for you, too – at surprisingly low cost. Send the coupon for further information. Or, consult your telephone directory for the Dodge office (in over 80 principal cities) nearest you.

F. W. DODGE CORPORATION
119 W. 40th St., New York 18, N. Y.

DODGE reports

F. W. DODGE CORPORATION
Construction News & Statistics Div., Dept. CC-41
119 West 40th Street, New York 18, N. Y.

Please ☐ send me your brochure "How Subcontractors Get More Work in New Construction."
☐ send full case history on Mr. Kirkland.
☐ have a Dodge Representative call.

Name _____

Company _____ Title _____

Address _____

City _____ Zone _____ State _____

Only Maginniss

Uni-Lectric VIBRATOR

gives you these . . .

Plus BENEFITS

Smaller, lighter head than competitive models.

*

Designed for concrete jobs such as floor slabs, footers, curbs, gutters and thin wall culverts.

*

Operates on any 115 volt, DC or 50/60 cycle AC current.

*

Portable—completely self-contained—can be carried in car trunk or truck tool box.

*

No motor servicing or adjustment problems—Cartridge type motor quickly removed for low-cost trade-in replacement.

*

Has built-in thermostat to protect it from overheating.

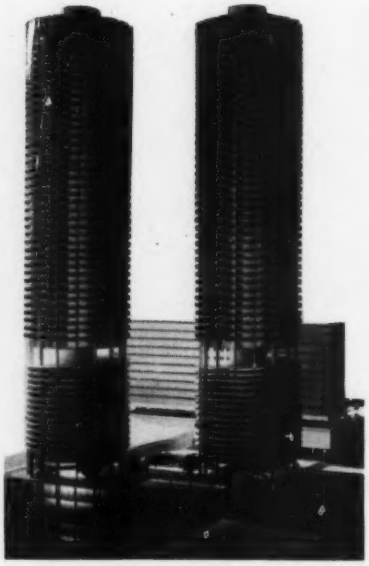
WHERE TO USE IT:

Bridge footers, piers, columns and decks
Building footers, columns and floors
Sidewalks
Driveways
City Concrete Maintenance
County Concrete Maintenance
State Concrete Maintenance

Maginniss HI-LECTRIC POWER TOOLS

Find your nearest distributor in the Yellow Pages.

MAGINNISS POWER TOOL CO.
154 Distl Avenue
Mansfield, Ohio



cylinder-shaped skyscrapers

Chicago — Construction of the $36 million Marina City center, which will have the two tallest apartment buildings in the world, recently got underway in Chicago as crews of Case Foundation Co. began to install concrete caisson foundations to support two 60-story, cylinder-shaped skyscrapers.

The Marina City project, a block-square undertaking which will take two years to complete, will consist of twin apartment buildings, plus a 10-story commercial structure, shops, and recreational facilities.

The caisson work features the use of a new and enormous drilling tool, which towers nearly eight stories high and weighs more than 120 tons. The drill is being used to overcome the problem of extremely tough rock boulders plus old underground freight tunnels which contain installations for utilities, such as pipes and wiring.

A total of 154 caissons, approximately 5½-feet each in diameter will go down 110-feet to solid bedrock. More than 50 million pounds of concrete and steel will be used in this major construction project.

Sproule -osophies

Let blockheads read what blockheads write.
—Earl of Chesterfield

. . . and sensible men read what sensible men write.
—Bob Sproule

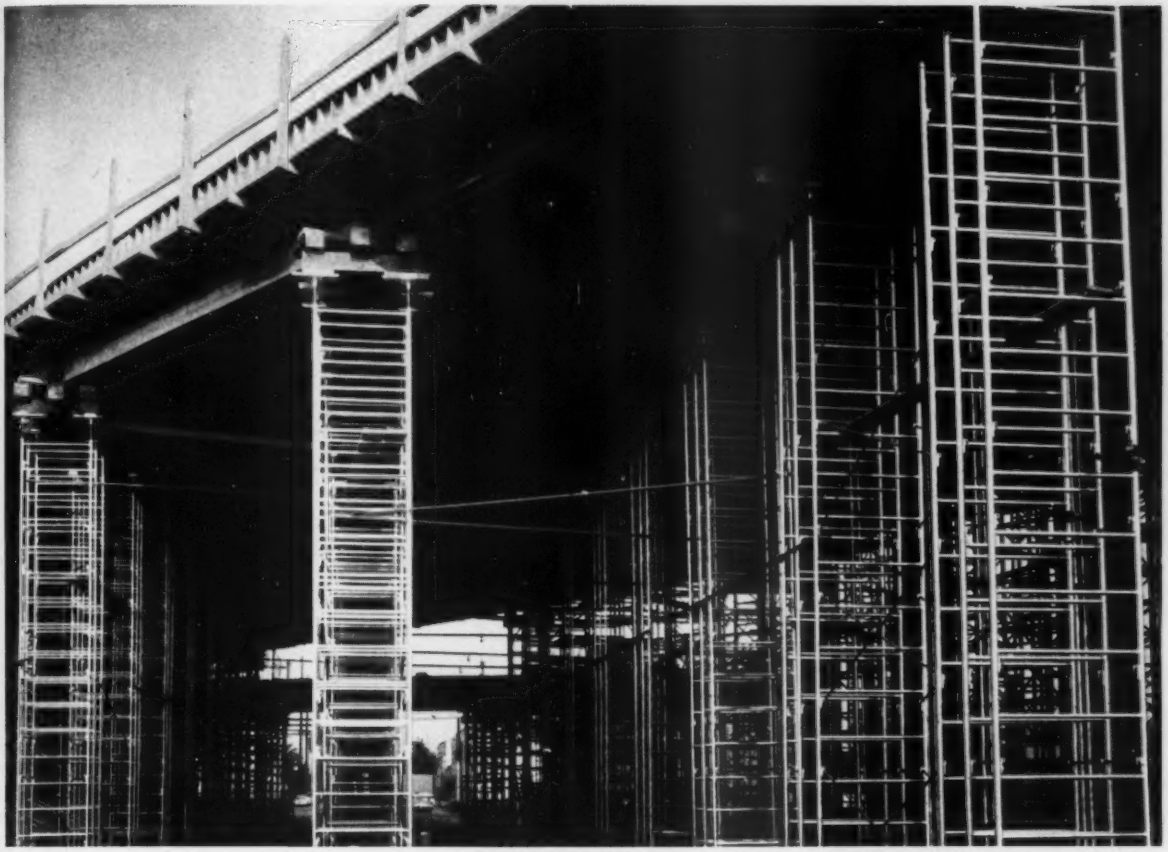
I'VE SAID what the wise old Earl left unsaid to take both of us off the hook. I am a sensible man. You are a sensible man. Therefore, read on. The following words about concrete-block production are not for the consumption of blockheads.

If you make concrete blocks, you're familiar with the problems at hand——production time and quality. And as a good businessman you have more than a passing interest in costs.

How would you like to save on production time—50% of waiting time before steaming and another 50% of the actual steaming time? Calcium chloride can help you do both. How about those delays for drying time before shipment? More time chloride can save you. And then there's the all-important matter of quality. Calcium chloride cuts down on breakage . . . pays for itself if it saves you just one block in a hundred. Better blocks at lower costs. Interested? If so, write for our booklet, "Better Concrete in Every Season with Wyandotte Calcium Chloride." Write: *Wyandotte Chemicals Corporation, Dept. FS, Wyandotte, Mich.*

WYANDOTTE CHEMICALS

MICHIGAN ALKALI DIVISION
HEADQUARTERS FOR CALCIUM CHLORIDE



New Heavy Duty 20K Frames Shore 6-mile Freeway Access

BY MOVING a minimum amount of equipment only 19 times, the contractor, Griffith Company, is able to save considerable material costs on shoring work for the six mile Santa Monica viaduct section of a connecting Freeway near Los Angeles.

The design of the job involves a heavy concrete box girder system. To provide adequate support for this construction, PS Co.'s new heavy duty 20K "Trouble Saver"® Shoring frames are used. 9000 of these frames shore a section 850' long by 65' wide. Lift trucks move this same shoring equipment to adjoining sections of the same size. In this way the work is accomplished with minimum material.

Weight of the concrete box girders can be realized from these details: bottom slab is 5½" to 6½" thick; top 5" to 5½" thick; box depth is 4' to 5' and made in three pours. Overall viaduct height varies from 15' to 33'. A total of 13,900 20K frames was used on this project.

20K FRAMES of "Trouble Saver" Shoring are designed for heavy duty work in accordance with PS Co.'s high standards of safety and are tested under simulated field conditions—and proved on recent jobs, like this one—to safely support up to 10,000 lbs. on each leg. Frames are 4' wide, in 3'6", 5' and 6' heights. Legs are 2⅜" o.d. U-heads, sprockets, adjustable legs, base plates can be arranged in any manner, top or bottom. For complete details, write for Bulletin PSS-51.

PS STEEL SCAFFOLDING • SHORING • SALES • RENTALS

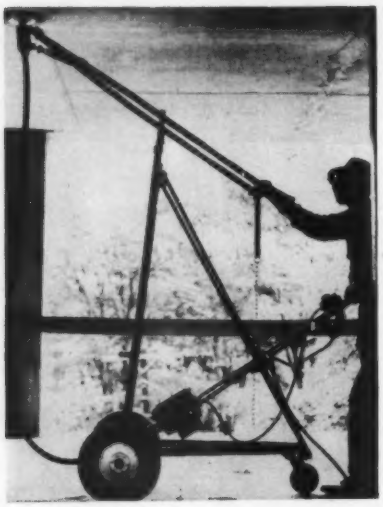
THE PATENT SCAFFOLDING CO., INC.

38-21 12th Street, Dept. CCN, Long Island City 1, New York

1550 Dayton St., Chicago 22 • *Branches in all principal cities* • 6931 Stanford Ave., Los Angeles 1

IN CANADA: Canadian PS Co., 329 Dufferin St., Toronto

HOW TO GRIND CONCRETE CEILINGS



More and more building specifications require finely finished concrete ceilings. Because of this new requirement, Stow Manufacturing Co. has developed the Stow CG Ceiling Grinder—a special machine designed to grind off form marks and fins, cut off nails and smooth the entire surface.

With this machine, one man can average 4,000 square feet per day. Simple to operate, it pushes along like a baby carriage.

All models have a 1 HP totally enclosed motor operating at 3450 RPM. The disc is a 9" Bayflex of cotton fibrous material with a silicon carbide abrasive bonded with resin.

Two models are available:

CG 10—for ceilings 8 to 10 ft. high
CG 18—for ceilings 10 to 18 ft. high

Also Available With Gas Engine

Stow Manufacturing Co. also makes a complete line of portable electric flexible shaft grinders for both wet rubbing and dry grinding walls. For more information on the Stow CG Ceiling Grinder and a copy of Stow's "Grinding Concrete" pamphlet, which gives the proper speeds for both wet rubbing and dry grinding, contact your Stow distributor or send in the coupon below. Stow also makes a complete line of concrete vibrators, rotary trowels and screeds.

STOW MANUFACTURING CO. Dept. H-2
354 Shear St., Binghamton, N. Y.

Please send me your pamphlet, "Grinding Concrete."

Name..... Title.....

Company.....

Street.....

City..... State.....

NCCA holds fourth convention

Hollywood, Fla.—Technical problems were the first order of business at the annual convention of the National Concrete Contractors Association held here in January. Guest speakers included *Vincent P. Ahearn,* managing director of the National Ready Mixed Concrete Association, whose topic was Washington trends; *Charles E. Proudley,* research engineer for the Carolinas Ready Mixed Concrete Association, who dealt with the broad subject of curing; *Gary Marable,* manager of Ready Mix Concrete Company, Fort Lauderdale, who spoke on public relations problems; and *Howard McGinnis,* Portland Cement Association, who moderated a lively discussion of the causes and prevention of spalling and popping.

Another featured speaker was *R. A. DeRose,* Paddock Pools, Van Nuys, California, who presented some straight-from-the-shoulder facts on the profit possibilities in swimming pool construction. He described 1960 as a year of leveling off and deglamorizing in making the point that too many contenders in this field seem to have lost sight of the profit motive.

Harold W. Allen of Dayton, Ohio, was the recipient of a trophy commemorating his outstanding service to NCCA in bringing in new members. The trophy was donated by the Master Vibrator Company and the presentation was made by *Maurice H. Schafer* of Peoria, Illinois.

EASIER FORM STRIPPING
Smoother too!

Saves time. Treated forms won't stick . . . gives cleaner, stain-free surface ready for painting. You get 7 or more pours without cleaning or re-treatment.

Buy From Your Favorite Supplier

E. A. THOMPSON CO., INC.

San Francisco - Phone UNderhill 3-1963

Zell PRODUCTS

ELASTICRETE®
NATIONAL-CRETE®

For lightweight concretes of PROVEN Performance in . . .

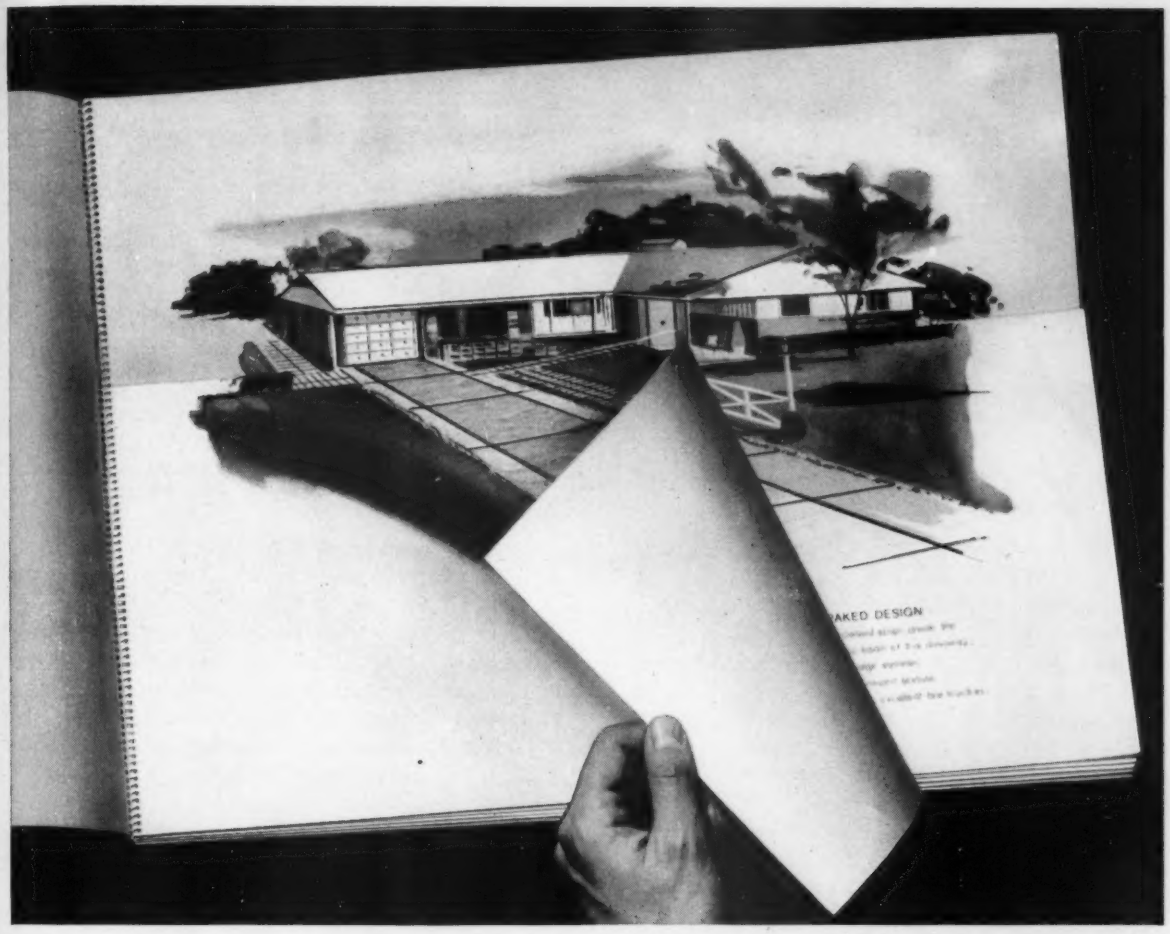
- ***Roof Decks***
- ***Floor Systems***
- ***On Grade***
- ***Precast Members***

Other applications include thermal and sound insulation, structural concretes.

Nationally distributed with applicators in principal cities. Direct your inquiries to . . .

ELASTIZELL
CORPORATION OF AMERICA
P. O. 321 • ALPENA, MICHIGAN

GREENVILLE • JERSEY CITY • DALLAS • LITTLE ROCK • CHICAGO • LOS ANGELES • ATLANTA • MIAMI • BOSTON • NEW ORLEANS • SEATTLE • ORLANDO • SALT LAKE CITY • PHOENIX • PHILADELPHIA

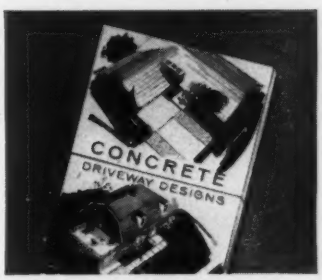


New demonstration book helps you sell more CONCRETE DRIVEWAYS!

Sell modern "custom designs" and you'll sell more concrete driveways. This big full-color book, "*Concrete Driveway Designs*," will make the job easier. Prepared by Portland Cement Association, this demonstration book has what it takes to excite the interest of homeowners—to win orders for custom-designed concrete driveways.

Put this book down before your prospect's eyes. Every flip of the ingenious die-cut pages presents a new idea. He'll see textured designs, geometric patterns, exposed aggregate surfaces, ribbon and patio block combinations—and a whole array of color possibilities. Only with *concrete* are such imaginative, custom-designed driveways possible! Start now to line up prospects for new driveways.

FREE! Write for copy of "Concrete Driveway Designs" for use in selling to homeowners. Additional copies available at low cost. (U. S. and Canada only)



Special selling folder
to leave with prospects or for mailing. Full color, with suggested driveway designs. Space for your firm name. Sample *free* on request. Quantities available at moderate cost.

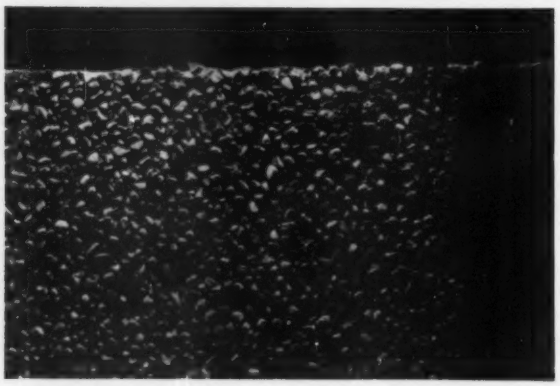
PORTLAND CEMENT ASSOCIATION
Dept. A4-98, 33 W. Grand Ave., Chicago 10, Ill.
A national organization to improve and extend the uses of concrete

watch for
Concrete Industries HORIZON HOMES Program

NCCA officers and directors at fourth annual convention

Pictured here are the directors and officers of the National Concrete Contractors Association who attended the organization's recent fourth annual convention in Hollywood, Florida. Standing, left to right: *Roger H. Corbetta,* New York (director); *Bert Carey,* Forest Park, Illinois (past president); *Robert Burns,* Dallas, Texas (director); *Allen Yost,* Sterling, Colorado (director); *Elbert F. Lewis,* Greensboro, North Carolina (director); *William DeGraf,* Chicago (treasurer); and *Michael Savoea,* Akron, Ohio (director). Seated, left to right: *H. J. Bjornsen,* Cedar Rapids, Iowa (3rd v.p.); *Philipp J. Hoerr,* Peoria, Illinois (2nd v.p.); *Troy Pauley,* Charleston, West Virginia (secretary); *Henry Myers,* Chicago (president); *William S. Hodges,* Muskegon Heights, Michigan (director); *Charles W. Middleton,* St. Louis, Missouri (director); and *E. Ray Freeman,* Dallas, Texas (1st v.p.).

CERESIT new products



exposed aggregate

A retarder for making exposed aggregate concrete can be applied to the surface of freshly placed concrete or to the formwork before placing. Retarder does not hinder the hardening of the concrete mass while chemically retarding the set of ⅛ inch of mortar at the surface. After 12 to 24 hours the retarded surface is washed away with a jet of water. Greater depths than ⅛ inch of retarding requires a heavier application. Material leaves no discoloring film on the surface. Ceresit Corp., 3227 Shields Ave., Chicago 16, Illinois.

SYMONS Steel Stake

Can Be Reused Indefinitely

Drives easily into hard earth. Can be used for practically any type of stake work. This popular item is available in 12", 18", 24" 30", 36" and 42" sizes.

Pullout hole for easy removal
Easily secured to lumber—can be nailed every 1" O.C.
"I" beam design drives easier, holds best
Hi-Carbon Alloy Steel tough to bend
Rugged point with minimum deflection

Symons

SYMONS CLAMP & MFG. CO.
4271 Diversey Ave., Chicago 39, Ill., Dept. D-1

We will send contractors a sample 12", 18" or 24" stake if request is received on company letterhead. Please include 50c for 12", 75c for 18", $1.00 for 24" to cover cost of postage and mailing.

Name_____
Firm_____
Address_____
City_____ Zone____ State_____

Tips On Building Watertight Concrete Structures

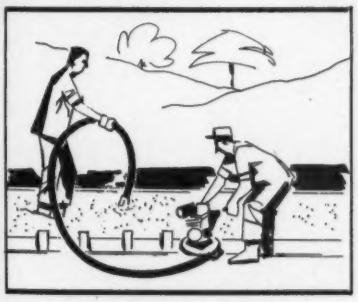
The increasing use of concrete for swimming pools, basement playrooms, industrial sub-surface garages and similar structures continues to reflect the growing interest in watertight concrete. Moreover, of the many questions asked Alpha Field Engineers, those about watertight concrete today are one of the most common.

Watertight concrete can be produced without undue difficulty when proper emphasis is placed on good design, good concrete and good workmanship. Extensive testing and careful examination have revealed that the most common reasons for leaky concrete are **inferior workmanship, poor materials and too lean a mix.**

Good Concrete:

Modern ready mix concrete plants today are equipped to furnish concrete of the very highest quality, but the user must specify the mix and make sure the concrete is not ruined on the job by someone insisting on additional water. The most modern mixing plant, the best materials and the best mix design mean nothing when the water content is not controlled and the concrete is improperly placed and cured.

The Right Mix:



Use a quality concrete mix and place it in even layers not more than 18 in. deep. Avoid honeycombing by adequately spading or vibrating each layer.

Experience has indicated that for such structures as tanks and reservoirs the concrete should contain not more than 6 gal. of water per sack of cement. For concrete in very heavy sections such as dams, the water may be increased to 7½ gal., while for thin sections it should be reduced to 5 gal. These amounts include the water which is introduced as surface moisture in the aggregate. Coarse aggregate usually contains little if any moisture, but the sand often contains a considerable amount of water.

Avoid Segregation in Placing Concrete:

Concrete should be delivered at a number of points around the form to avoid chuting over long distances. This prevents segregation, a source of possible leaks.

Of all the steps in watertight concrete work, handling, placing and compacting in the forms are among the most important. Concrete should not be allowed to drop freely more than 5 or 6 feet, as segregation is likely to occur if it falls through a greater distance. Flat chutes should not be used even for short distances. **Chutes should be deep with rounded bottoms, and constructed of or lined with metal.** Buggies should be operated on smooth runways. Buggies equipped with pneumatic tires reduce segregation. Dumping a large quantity of concrete in one place and then causing it to flow horizontally over a long distance in the form is not good practice and should never be done. Concrete should be distributed by placing in uniform layers 1 foot to 18 inches thick, spading or vibrating each layer to consolidate the concrete.

Construction Joints:

One of the frequent sources of difficulty has been at construction joints. Wherever possible, the work should be so planned that placing of concrete will be continuous. In large structures expansion joints are sometimes provided, but placing should be continuous between joints. Where a construction joint must be made, precautions should be taken to secure good bond between the layers. If the structure is to be subjected to water pressure such as in a tank and if a construction joint is to be made between hardened and fresh concrete, a waterstop should be installed.

Curing:

Keeping the concrete wet for at least 7 days when normal portland cement is used, or 3 days if high-early strength portland cement is used, should be required on all watertight construction.

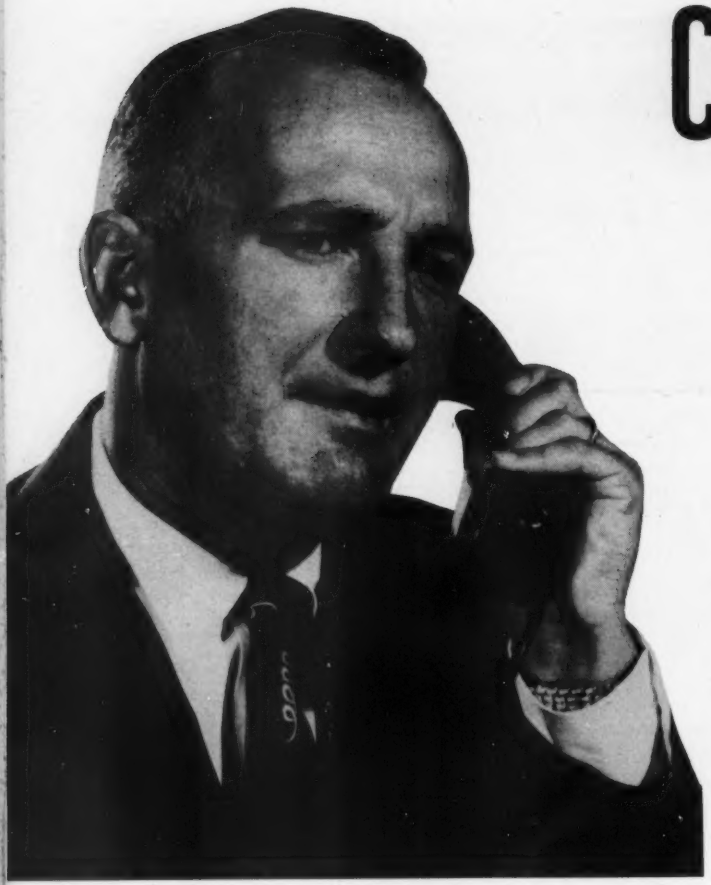
Surface coatings are helpful in overcoming leakage on some structures, but cannot be expected to overcome faulty joints or defective areas. An effective surface treatment is the application of a grout of equal parts portland cement and fine sand mixed to the consistency of paint and applied with brushes. The concrete should be damp when this is applied and the coating should be dampened as soon as the cement has set sufficiently so that it will not be washed off. It should be kept damp at least 24 hours.

Use whitewash-size brush to apply surface coating.

More Information

Your Alpha Field Engineer can answer your questions on watertight concrete construction and help with any other problems involving the use of Alpha cement. Reprints of this advertisement are yours for the asking.

ALPHA
PORTLAND CEMENT COMPANY
Alpha Building, Easton, Pa.



CALL or WRITE

for an immediate reply when seeking more information on the products advertised in this issue

ADVERTISERS INDEX

Alpha Portland Cement Co. **123**
15 South 3rd St.—Easton, Pa. — BLackburn 8-6231

Burke Concrete Accessories **114**
2690 Harrison St.—San Francisco, Calif. — ATwater 2-0840

Ceresit Corp. **122**
3227 South Shields Ave.—Chicago 16, Ill. — DAnube 6-5757

Concrete Transport Mixer Co. ..... **Cover 2**
4985 Fyler Ave.—St. Louis 9, Mo. — FLanders 2-7800

Dee Concrete Accessories ..... **106 a,b,c,d**
670 N. Michigan Ave.—Chicago 11, Ill. — MO 4-3664

Dewey & Almy Chemical Co. **106**
Cambridge 40, Mass. — TRowbridge 6-1400

F. W. Dodge Corp. **117**
119 West 40th St.—New York 18, N. Y. — OXford 5-3000

Elastizell Corp. of America **120**
815 West Miller St.—Alpena, Mich. — ELmwood 4-2138

Gar-Bro Manufacturing Co. **111**
2415 E. Washington Blvd.—Los Angeles, Calif. — LUdlow 7-5291

Goldblatt Tool Co. **116**
1910 Walnut St.—Kansas City 8, Mo. — BAltimore 1-4313

Maginniss Power Tool Co. **118**
154 Distl Ave.—Mansfield, Ohio — LAfayette 2-8011

Master Builders Co. ..... **Cover 3**
2490 Lee Blvd.—Cleveland 18, Ohio — ERieview 1-5000

W. R. Meadows Inc. **109**
29 Kimball St.—Elgin, Ill. — SHerwood 2-4501

Morgen Manufacturing Co. **112**
Dept. C—Yankton, South Dakota — NOrth 5-7422

Patent Scaffolding Co. **119**
38-21 12th St.—Long Island City 1, N. Y. — EXeter 2-3660

Portland Cement Association **121**
33 West Grand Ave.—Chicago 10, Ill. — SUperior 7-9660

Remington Arms Co., Inc. **104**
25000 South Western Ave.—Park Forest, Ill. — SKyline 6-4200

Richmond Screw Anchor Co., Inc. **108**
816-838 Liberty Ave.—Brooklyn 8, N. Y. — MIdway 7-4040

Sika Chemical Corp. **115**
35 Gregory Ave.—Passaic, New Jersey — PRescott 7-8020

Simplex Forms System, Inc. **110**
5603 Industrial Ave.—Rockford, Ill. — TRemont 7-1441

Stow Manufacturing Co. **120**
354 Shear St.—Binghamton, N. Y. — RAymond 3-6411

Symons Clamp & Mfg. Co. ..... **105 & 122**
4249 Diversey Blvd.—Chicago 39, Ill. — DIckens 2-5141

E. A. Thompson Co. **120**
1355 Market St.—San Francisco, Calif. — UNderhill 3-1963

Thor Power Tool Co. ..... **102 & 103**
175 North State St.—Aurora, Ill. — TWinoaks 2-7601

Truck Mixer Mfgrs. Bureau **107**
Munsey Bldg.—Washington 4, D. C. — NAtional 8-1143

Universal Form Clamp Co. **113**
1238 North Kostner Ave.—Chicago 51, Ill. — CApitol 7-1600

Wyandotte Chemicals Corp. **118**
1607 Biddle Ave.—Wyandotte, Mich. — AVenue 2-3300